PRECLINICAL SAFETY EVALUATION OF

"IDIVALLATHI MEZHUGU"

The dissertation Submitted by

Dr.K.NANTHINE, M.D(S)

Under the Guidance of

Dr. S. MURUGESAN, M.D(S)

Lecturer, Department of Nanju Noolum Maruthuva Neethi Noolum

Dissertation Submitted to

The Tamilnadu Dr. M.G.R. Medical University,
Chennai – 32

For the partial fulfillment of the requirements to the Degree of

DOCTOR OF MEDICINE (SIDDHA)

Department of Nanju Noolum Maruthuva Neethi Noolum

National Institute of Siddha

Chennai - 47

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled **"Preclinical safety evaluation of Idivallathi mezhugu"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. S. Murugesan, M.D(s),** Lecturer**.,** Department of **Nanju Noolum Maruthuva Neethi Noolum,** National Institute of Siddha, Chennai -47, and the dissertation has not formed the basis for the award of any Degree, Diploma, Fellowship or other similar title.

Date: **Signature of the Candidate**

Place: Chennai-47 **Dr. K. Nanthine**

BONAFIDE CERTIFICATE

Certified that I have gone through the dissertation submitted by **Dr. K. Nanthine, (Reg.No: 321416204)** a student of final year M.D(s), Branch-VI, Department of **Nanju Noolum Maruthuva Neethi Noolum**, **National Institute of Siddha**, Tambaram Sanatorium, Chennai-47, and the dissertation work has been carried out by the individual only. This dissertation does not represent or reproduce the dissertation submitted and approved earlier.

Place: Chennai-47

Date:

Name and Signature of the Guide,
Lecturer,
Department of Nanju noolum
Maruthuva Neethi Noolum,
National Institute of Siddha,
Tambaram Sanatorium,
Chennai-47.

Name and Signature of the HOD i/c,
Department of Nanju noolum
Maruthuva Neethi Noolum,
National Institute of Siddha,
Tambaram Sanatorium,
Chennai-47.

Name and Signature of the Director,
National Institute of Siddha,
Tambaram Sanatorium,
Chennai-47.

ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

" *It is not possible to prepare a project report without the assistance and encouragement of other people. This one is certainly no exception*"

I commence with the holy name of GOD benevolence and beneficence that enabled me to complete this research.

I express my sincere gratitude to the **Secretary, Department of AYUSH**, Health & Family Welfare, New Delhi and **Vice-chancellor,** The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

I would like to express my sincere thanks to **Prof. Dr. V. Banumathi, M.D(S),** Director-i/c, National Institute of Siddha, Chennai- 47, for giving approve to this topic.

I express my profound sense of gratitude to **Prof. Dr. M. Murugesan, M.D(S)**, Former Dean, Head of the Department, Nanju noolum Maruthuva Neethi Noolum, National Institute of Siddha, Chennai-47 for his valuable guidance to complete my project. He not only teaches us but also extended all valuable help and advice during the course of this project.

I express my deep sense of gratitude to **Dr. R. Madhavan M.D(S),** Head of the Department.i/c, Nanju noolum Maruthuva Neethi Noolum, National Institute of Siddha, Chennai-47 for all his support and guidance towards the completion of my dissertation.

I extent my gratitude to **Dr. R. RengaSundari, M.D(S)**, Associate professor, Nanju noolum Maruthuva Neethi Noolum, National Institute of Siddha, Chennai-47 for their guidance, memorable support and ceaseless encouragement in carrying out this work.

I thank Lecturers, **Dr. P. Shanmugapriya M.D (S)** & **Dr. V. Manjari M.D (S),** Dept. of Nanju Noolum Maruthuva Neethi Noolum, National Institute of Siddha, Chennai-47 for the guidance, continuous encouragement and for giving valuable suggestions to do this study.

I would like to extend my sincere and heartfelt obligation towards my guide **Dr. S. Murugesan, M.D (Siddha)**, Lecturer, Dept. of Nanju Noolum Maruthuva Neethi Noolum, National Institute of Siddha, Chennai-47,who gave active guidance, help, cooperation, and encouragement without whom I would not head away in this project.

I am thankful to **Dr. D. Aravind MD(S)** Assistant professor, Dept. of Botany, National Institute of Siddha, chennai-47 **R. Shakila** Research Officer (Chemistry), Siddha Central Research Institute, Arumbakkam, Chennai-106 for their support and guidance of my drug authentication.

I would like to pay a special note of thanks **to Dr. B. R. Senthil Kumar BSMS, M.Sc, (physiology),** National Institute of Siddha, Chennai-47 for his support to carry out physiological studies.

I am deeply indebted t**o Dr. V. Suba, M.Pharm., Ph.D,** Assistant professor, Dept.of Pharmacology, National Institute of Siddha, Chennai-47 for her valuable teaching about the basics of Pharmacology and Toxicity studies which helped me a lot to complete my study

I thank **Dr. A. Muthuvel, M.Sc (Biochemistry), Ph.D** Assistant professor, National Institute of Siddha, Chennai-47 for his guidance in doing biochemical studies.

I am thankful to **Dr. Gayathri Natarajan, MVSc**, Veterinarian, National Institute of Siddha, Chennai-47 for her guidance and support in animal sacrifice.

My gratitude to **Mr. M. Subramanian**, **M.Sc., (Statistics),** senior Research Officer, National Institute of Siddha, Chennai- 47, for his valuable help in statistical analysis.

I thank the library staffs and animal house attender of National Institute of Siddha, Tambaram Sanatorium, Chennai-47, from where I derived much of the literary support and help to maintain animals.

I would like to express my sincere gratitude **to Dr. D. Sivaraman., M.Pharm., Ph.D Scientist – C (Pharmacology and toxicology Division)** Centre for Laboratory Animal Technology and Research R&D unit, Sathyabama University, Chennai who greatly helps to carry out all the animal tests.

I also acknowledge with a deep sense of reverence, my gratitude towards my parents, who has always supported me morally as well as economically.

At last but not least gratitude goes to all of my friends who directly or indirectly helped me to complete this project.

It would not be fair if I do not regret for all the animals that lost their lives for the sake of my study and without which i would not have been successful in my study.

" With modicum and civility this book is dedicated at the lotus feet of my parents''

CONTENTS

INTRODUCTION

CHAPTER 1

INTRODUCTION

The word Siddha means “an object to be attained”, “perfection” or “heavenly bliss[1]. The Siddha system of medicine originated from southern part of India historically dates back to around 5000B.C.

It is one of the traditional medical system in the world and deals with physical, psychological, social and spiritual well-being of an individual. The roots of this system are intertwined with the culture of ancient Tamil civilization. The system aims in attaining Eternal bliss and to defeat mortalility. However to attain this one should posses enough physical and mental strength[2].

The system was basically developed by 18 spiritual saints with supernatural divine powers belonging to southern part of India called as “**SIDDHARS**”.

Siddhars were the concept that a healthy soul can be developed through healthy body. So they developed methods and medication that are believed to strengthen their physical body and thereby their souls too[2].

உடம்பார் அழியின் உயிரார் அழிவர்

திடம்பட மெய்ஞானம் சேரவு மாட்டார்

உடம்பை வளர்க்கும் உபாயம் அறிந்தே

உடம்பை வளர்த்தேன் உயிர் வளர்த்தேனே[3].

-திருமூலர்

WHO has defined the traditional medicine as “the sum total of all the knowledge and practices, whether explicable or not, used in diagnosis, prevention and elimination of physical mental or social imbalance and relying on practical experience and observation handed down from generation to generation, whether verbally or in writing.

The WHO estimates that perhaps 65 to 80% of the world population uses traditional medicine. The recent interest on traditional medicine has taken up great dimensions in changing the health care scenario across the globe[4].

Siddha system of medicine practiced in south India has number of remedies for various ailments as mentioned in Siddha pharmacopoeia which includes drugs of

Mooligai/Thavaram (Herbal)

Thathu (Inorganic substances)

Jeevam or Sangamam (Animal products)

According to their mode application the Siddha medicine could be categorized into two classes:

1. Internal medicine and

2. External medicine.

Among 32 internal medicine mezhugu is one among them and its shelf life is for 5 years.

Mezhugu- This is of two types:

a. Arraippu mezhugu (Obtained by grinding drugs).

b. Churukku mezhugu (Obtained by heating them by adding oily substances)[5].

In Siddha system each and every plants, minerals and metals are having well defined purification process. The toxic substance and their antidotes are well documented in Siddha literature.

Any medicines need to be evaluated for their safety before administration. This is not mandatory requirement because the siddha medicine has been in traditional use for years with proven efficacy and safety in experienced. Toxicological studies need to be conducted in order to prove the safety of the medicine and scientific approach of our sages, the siddhar's thus paving the way to world wide acceptance of siddha drugs.

Idivallathi mezhugu is one of the major Siddha medicine which is widely used to cure various ailments Soolai (Pain)**,** Kushtam (Leprosy), Kiranthi(Syphilis),

Envgaigunmam (Peptic Ulcer). Idivallathi mezhugu contain nearly 16 ingredients[6]. One of the major ingredients is Cherankottai (Semicarpous anacardium).

The traditional healers and physician of Indian systems of medicine continue to use cherankottai (Semicarpous anacardium) in various form in their clinical practice.

In Siddha system of medicine it is well known Vegetable Irritant poison. Though it is a poisonous plant but it has various Therapeutic properties when it is used in purified form. They have several side effects when it is used in unpurified form.

In our Siddha text Gunapadam first part cherankottai is mentioned for these lines

"சேராங்கொட்டை தூய்மைப்படுத்தி இதர சரக்குகளுடன் சேர்த்து முடித்த மருந்து பெருமை உடையது."

"யாவரும் மெச்சும் இரசத்தால் தீரும் பெருநோய்களும் சேராங்கொட்டையால் தீரும்." என குறிப்பிடபட்டுள்ளது[7].

At present there are many researches going on ingredients of Idivallathi mezhugu. Apart from the above mentioned therapeutic uses the ingredients of Idivallathi mezhugu has the ability to cure major diseases like cancer and nowadays there are many researches going on ingredients of Idivallathi mezhugu. But as a compound formulation there are no studies has been done on Idivallathi mezhugu.

In present scenario toxicological evidence and the standardization is need to prove the safety and chemical profile of any medicine. This may help the acceptance of the medicine worldwide.

Safety is major concern of treatment which demands evaluation whereas efficacy just needs validation. Safety can also be defined the control of recognized hazards to achieve an acceptable level of risk. So toxicity evaluation is very essential for the profile of any drug.

So I proposed to take **Idivallathi mezhugu** for my dissertation study to standardize and to evaluate the toxicity profile.

CHAPTER 2

AIM AND OBJECTIVES

AIM:

To evaluate the Preclinical safety profile of Idivallathi mezhugu

OBJECTIVE:

- To prepare Idivallathi mezhugu (IVM).
- To study the physico-chemical properties, bio chemical analysis and phyto chemical analysis of Idivallathi mezhugu (IVM).
- To study the Microbial load, aflatoxin and pesticide residue for Idivallathi mezhugu (IVM).
- To study the spectroscopic analysis of Idivallathi mezhugu (IVM).
- To develop the toxicological profile of Idivallathi mezhugu (IVM) in experimental animals to confirm its safety by acute and long term toxicity study as per WHO guidelines.

LITERATURE REVIEW

சேராங்கொட்டை

வேறு பெயர்:

சேங்கொட்டை, வல்லாதி, வல்லாதகி, எரிமுகி, பல்லாதகி, கிட்டாக்கனிக்கொட்டை, நந்திவித்து.

பயன்ப்படும் உறுப்பு - கொட்டை, பருப்பு

சுவை - கைப்பு, விறுவிறுப்பு

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

உடற்றேற்றி

புண்ணாக்கி

குணம்:

குட்டங் கயரோகங் கொல்லும் விடபாகந்
துட்டந் தருகிருமி சூலையும் போம் - மட்டலருங்
கூந்தன்மயி லேகிரந்திக் கூட்டம்போஞ் செங்கையில்
ஏந்துசேங் கொட்டைதனை யே.

(அகத்தியர் குணவாகடம்)

இது பெரு நோய், இளைப்பு நோய், நஞ்சுகள், சூலை, இவைகளைப் போக்கடிக்கும், மேலும் திமிர்ப்படை, கருப்புப்படை, வெண்படை (வெண்குட்டம்), தீராக்கடி, மூலம், வளி நோய்கள், குன்மம், இவைகளையும் விலக்கும்[7].

நஞ்சுக் குறிகுணம்:

உடம்பில் பட்ட மாத்திரத்திலேயே வேக்காட்டை உண்டாக்கி (கொப்புளங்களை) புண்ணாக்கும் மருந்து செவ்வையானதாகப் பக்குவப்படாவிடில் உட்கொண்ட உடனேயே வாய், வயிறு, குடல், முதலியன புண்ணாகும். சில சமயம் மந்தம், எரிச்சல், வாந்தி,

கழிச்சல் முதலியவைகள் உண்டாகும். உடம்பை ஊதச்செய்யும். தூக்கத்தைக் கெடுத்து மேலும் பல துன்பங்களை உண்டாக்கும். அத்துடன் சாவையும் உண்டாக்கும்.

நஞ்சு முறிவு:

சேராங்கொட்டை நெய் உடல் மேற்பட்டு உடல் ஊதிவிட்டால் செங்கல்லைப் பொடி செய்து உடலில் ஒற்றடம் போட்டு மெழுகையும் நல்லெண்ணெயையும் சேர்த்துக் காய்ச்சிக் மேலுக்கும் பூசினால் ஊதின உடல் வற்றிவிடும்.

சேராங்கொட்டைப்பாலால் உண்டாகும் புண்ணுக்கு முறிவு:

கோரைக்கிழங்கு, சந்தனம், எள், ஏலரிசி சரி எடை கூட்டி நீர் விட்டரைத்து தேனிற் கலந்து உடல் மேல் பூச மேற்ப்படி புண் நீங்கும். சேங்கொட்டையை உட்கொண்டுவிட்டால் புளியிலையை நன்றாக இடித்து அதன் அளவிற்கு எட்டுப்பங்கு ஆற்றுநீர் சேர்த்து அதில் மேற்தோல் சீவின ஒரு இளநீரைப் போட்டு வேக வைத்து அத்தேங்காய் வழுக்கையைத் தின்று அந்நீரையும் உட்கொள்ளச் சேராங்கொட்டையின் வேகம் தணியும்[8].

சேரும் மருந்துகள்:

- மகாவல்லதி இலேகியம்
- இரச கெந்தி மெழுகு
- நந்தி மெழுகு
- சீனவல்லாதி மெழுகு
- நீரடி முது வல்லாதி
- சராபராச மாத்திரை[9]

SEMICARPUS ANACARDIUM

This tree is found growing on the sub-Himalayan and tropical parts of India as far as Assam10. In India it is called as "marking nut" by Europeans, because it was used by washermen to mark cloth and clothing before washing, as it imparted a water insoluble mark to the cloth[11].

SYNONYMS:

Sanskrit: Bhallataka; Bhallatamu; Agnimukhi; Arushkara. **English**: Marking nut tree. **Germany**: Ostindishcher Dintenbaum. **Hindi & Punjabi:** Bhela; Bhilwa. **Bengali**: Bhela; Bheltuki. **Gujarati**: Bhiamu. **Telugu**: Jeedivittulu; Jidi-chettu. **Tamil**: Shenkottai; Shay-rang; Serankottai. **Malayalam**: Chermara. **Arabian**: Beladin[10].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida
Order	: Sapindales
Family	: Ancardiaceae
Genus	: Semicarpus L.
Species	: Semicarpus anacardium L[12].

PARTS USED:

Fruit (Seeds), gum and oil.

CHEMICAL CONSTITUENT:

Kernel of the nut contains a small quantity of sweet oil; "the pericarp of the fruit contains a bitter and powerful astringent principle (which is universally used in India as a substitute for marking nut). The black corrosive juice of the pericarp contains a tarry oil consisting of 90% of an oxy-acid named anacardic acid and 10% of a higher, non-volatile alcohol called cardol. Catechol and a mono-hydroxyphenol which he called 'anacardol', besides two acids and a fixed oil from the kernel of the nut. By extracting

the crushed seeds the following products are isolated: - a fixed oil; a monohydroxyl compound, to which the juice owes its corrosive properties; Catechol; two monobasic acids, the potassium salt of an acid with strongly reducing properties. Other constituents are –"Diacetyl of Hydrobhilawanol; Dibenzyl Hydrobhilawanol; Mononitrohydrobhilawanol Methyl Ether; Dinitrohydrobhilawanol Dimethyl Ether. From the juice of pericarp the following constituents are isolated – (1) a Monohydroxyphenol, (2) An o-dihydroxy compound. This has been called as 'bhilawanol' (3) a tarry non-volatile corrosive residue forming about 18% of the nut.

ACTION:

Juice of the pericarp and the oil are powerful escharotics. Oil is a powerful antiseptic and cholagogue. Ripe fruits are regarded as stimulant, digestive, nervine and escharotics. Marking nut is a gastro-intestinal irritant when taken digestive and carminative. It is a good cardiac tonic, and a general respiratory stimulant[10].

USES:

- The sweet fruit is carminative, tonic, aphrodisiac; lesions inflammation, stomatitis, piles, fever, weakness and paralysis; expels bad humours from the body – The pulp is tonic; good for piles.
- The smoke from the burning pericarp is good for tumours.
- The oil is hot and dry, anthelmintic, aphrodisiac, tonic; makes hair black; good for leucoderma, coryza, epilepsy and other nervous diseases; lesions inflammation; useful in paralysis and superficial pain; causes burns, ulcers, blebs[13].

TOXIC SIGNS AND SYMPTOMS:

- Applied externally, the juice causes irritation and a painful blister which contains acrid serum, which produces eczematous eruptions of the neighbouring skin with which it comes into contact, and there is itching. Later an ulcer is produced, and there may be sloughing.
- Taken by mouth, the juice causes less irritant action. In large dose, it produces blisters on throat and severe gastrointestinal irritation, dyspnoea, tachycardia, hypotension, cyanosis, absence of reflexes, delirium, coma and death.

TREATMENT:

- Gastric lavage
- Demulcent drinks
- When applied externally wash with lukewarm water containing antiseptic[14].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Pharmacology, Phytochemistry and Toxicology of *Semecarpus anacardium* Mishra Sanjeeb Kumar, Tiwari Prashant, Sahu Pratap Kumar Department of Pharmacology, School of Pharmaceutical Sciences, Siksha 'O' Anusandhan University, Bhubaneswar, India.

Abstract

Semecarpus anacardium Linn. (SA) or Bhallataka is a plant well-known for its medicinal value in Ayurvedic and Siddha system of medicine. *Bhallataka* is a semi-poisonous plant. However, before using therapeutically Shodhanasanskara of Bhallataka is carried out to avoid its toxic effect on the body. *SA* contains a variety of biologically active compounds such as biflavonoids, phenolic compounds, alkaloids etc. There are reports of antiatherogenic, anti-inflammatory, antioxidant, antimicrobial, anti-tuberculous, anthelmintic, hepatoprotective, anti-spermatogenic, nootropic, analgesic, hypoglycaemic, and anti-carcinogenic activity. Hence this review article is an attempt to highlight chemical constituents, toxicological aspects and various pharmacological activities of S.anacardium[15].

2. Apoptotic effect of Semecarpus ana cardium nut extraction on T47D breast cancer cell line Mathivadhani P, Shanthi P, Sachdanandam P

Abstract

There is an increasing interest in identifying potent cancer-preventive and therapeutic agents against breast cancer. A great number of reports have in recent years dealt with anticancer characteristics of Semecarpus anacardium nut extract (SA). The majority of these studies has been targeted on the protective effect rendered to the living system rather than the preventive effect on cancer cells. SA was tested for its inhibitory effect on human breast cancer cells (T47D). Cytotoxicity analyses suggested that these

cells had become apoptotic. SA was discovered to induce rapid Ca(2+) mobilization from intracellular stores of T47D cell line, and its cytotoxicity against T47D was well correlated with altered mitochondrial transmembrane potential. At the molecular level, these changes are accompanied by decrease in bcl(2) and increase in bax, cytochrome c, caspases and PARP cleavage, and ultimately by internucleosomal DNA fragmentation. Taken together, our results provide unprecedented evidence that SA triggers apoptotic signals in T47D cells[16].

3. Identification of urushiols as the major active principle of the Siddha herbal medicine *Semecarpus* Lehyam: Anti-tumor agents for the treatment of breast cancer Weimin Zhao, Lili Zhu, Sowmyalakshmi Srinivasan, Chendil Damodaran, and Jürgen Rohr

Abstract

Breast cancer (BCa) is the most commonly occurring cancer in women, comprising almost one third of all malignancies. Previously we reported that the *n*-hexane fraction (hSL) of the Siddha herbal medicine, *Semecarpus* Lehyam, relatively sensitized estrogen receptor-negative (ER−) BCa when compared to estrogen receptor-positive (ER+) BCa cells. In this study we used a bioassay-guided fractionation approach leading to a simplified fraction of hSL that effectively sensitized both ER+ (MCF-7) and ER− (MDA-231) BCa cells. Further bioassay-guided isolation led to the purification of three potent anti-cancer components from hSL which significantly induced apoptosis in both the BCa cell lines. Their structures were identified through NMR and mass spectroscopic analysis as (7;*Z,*10;*Z*)-3-pentadeca-7,10-dienyl-benzene-1,2-diol (**1**), (8;*Z*)-3-pentadec-10-enyl-benzene-1,2-diol (**2**) and 3-pentadecyl-benzene-1,2-diol (**3**). Compounds (**1**) and (**2**) turned out to be more active than (**3**). The overall results of this study suggest that these major components of hSL may be solely responsible for the anti-tumor effect of SL[17]

4. Anti cancerous efficacy of ayurvedic milk extract of *semecarpus anacardium* nuts on hepatocellular carcinoma in wistar rats Joice P. Joseph, Sunant K. Raval, Kamlesh A. Sadariya, Mayur Jhala and Pranay kumar

Abstract

The objective of the study was to determine the anticancerous efficacy of Ayurvedic preparation made of *Semecarpus anacardium* (SA) nuts. Five groups of rats were used for the study. Group I served as water control. Hepatocellular carcinoma (HCC) was induced in groups II, III and IV animals using N-nitrosodiethylamine as inducing agent followed by phenobarbitone as promoter for 13 weeks. Group-II animals were kept untreated as hepatocellular carcinoma control. GroupIII animals were treated with Ayurvedic milk extract of *Semecarpus anacardium* nuts at dose mentioned in Ashtangahridaya, an authentic book of Ayurveda for 49 days and group-IV animals were treated with doxorubicin as reference drug at dose of 1mg/kg twice a week for 7 weeks. Group V animals were kept as drug (SA nut milk extract) control for studying the effect of nut milk extract on normal rats. After 154 days of experiment, all animals were subjected to screening for HCC by estimation of liver enzymes, HCC marker (alpha-2 macroglobulin) and histopathology. Both liver enzymes and HCC marker were increased in hepatocellular carcinoma control along with neoplastic changes in liver and were decreased in *Semecarpus anacardium* nut milk extract treated group. The Ayurvedic drug showed positive correlation with the action of doxorubicin. This study demonstrated the efficacy of *Semecarpus anacardium* nut milk extract for the treatment of hepatocellular carcinoma either alone or along with chemotherapy[18].

5. In vitro anticancer potential of Semecarpus anacardium Linn.

Abstract

Background:

Keeping in view the toxicity of Semecarpus anacardium Linn as reported in the traditional literature, the present study was carried out to evaluate the in vitro cytotoxic activity of ethanolic extract of Semecarpus on two different cell lines. **Materials and Methods:**

The ethanolic extract of Semecarpus was prepared using cold extraction method. The 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay of ethanolic

extract was carried out on HeLa and SiHa cell lines for determination of cytotoxicity.

Results:

The IC50 values of ethanolic extract of S. anacardium in HeLa and SiHa cell lines were 44.0 µg/ml and 57.0 µg/ml, respectively. The extract was standardized by thin layer chromatography and Gas chromatography mass spectrometry.

Conclusion:

The results showed good cytotoxic activity in the ethanolic extract of S. anacardium in both the cell lines may be due to the presence of toxic flavones[19]

எள்

வேறு பெயர்:

“திலம்”

இ.ஃ.து, இந்தியாவில் ஏராளமாகப் பயிரிடப்படுகின்ற ஒரு சிறிய செடி. இதில் வெள்ளை, கருமை, செம்மை என மூன்று பிரிவுகளுண்டு. இவைகளல்லாமல், காட்டெள்ளு, சிற்றெள்ளு, பேரெள்ளு எனவும் பல வகுப்புகளுண்டு.

பயன்ப்படும் உறுப்பு - இலை, பூ, காய், விதை

சுவை - இனிப்பு

தன்மை - வெப்பம்

பிரிவு - இனிப்பு

செய்கை:

இலை - உள்ளழலகற்றி
வறட்சியகற்றி

விதை - ருதுவுண்டாக்கி
வெப்பமுண்டாக்கி
உரமாக்கி
சிறுநீர்பெருக்கி
பாற்பெருக்கி
மலமிளக்கி

எள்ளின் நெய் - உள்ளழலாற்றி
மலமிளக்கி
உடலுரமாக்கி
வறட்சியகற்றி

குணம்:

எள்ளுமருந் தைக்கெடுக்கும் எறனலாந் திண்மைதரும்
உள்ளிலையைச் சேர்க்கும் உதிரத்தைத் – தள்ளுமிரு
கண்ணுக் கொளிகொடுக்குங் காசமுண்டாம் பித்தமுமாம்
பண்ணுக் கிடர்புரியும் பார்.

இது மருந்தை முறிக்கும்: வெம்மை, காசம், ஐயம், இவற்றை பெருக்கும்: தொண்டையைக் கட்டும். கண்னுக்கு ஒளியையும், உடலுக்கு வன்மையையும் தரும். குருதிப் பெருக்கை உண்டாக்கும்.

வழக்கு:

- எள்ளினை ஊறவைத்த தண்ணீரை உதிரச்சிக்கலுக்குக் கொடுக்கலாம்.
- விதையின் விழுது ஒரு சுண்டையளவு வெண்ணெயில் சாப்பிட, குருதி மூலம் போம்.
- விதையை அரைத்து கொதிக்கவைத்துக் கட்டிகளுக்கு கட்ட, அவை பக்குவமடையும்[7].

சேரும் மருந்துகள்:

- நீரடிமுத்து வல்லாதி
- கலி வல்லாதி
- சூதகவாயு எள்ளு இளகம்
- சீன வல்லாதி மெழுகு

SESAMUM INDICUM

This small bush is indigenous to India and extensively cultivated in the warmer regions. Three varieties of Sesamum seeds are found: black, white and red or brown. The black variety is the most common and yields the best quality of oil and is also the best suited for medicinal purposes. But the white variety is richer in oil.

SYNONYMS:

Sanskrit: Tila; Snehapahla; Tilaha. **English**: Gingelly; Sesamum; Sesame. **Germany**: Sesom. **Hindi**: Til; Tir. **Bengali**: Tel; Til; Kala-til; Sumsum; Chadu-til; Rakta-till; Sanki-till. **Gujarati**: Tal. **Punjabi**: Til; Tili; Kunjad. **Telugu**: Nuvvulu; Nuvvu; Pollanuvvulu; Guvvulu. **Tamil**: Ellu; Yellu-cheddie. **Malayalam**: Karuellu[10]

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida
Order	: Lamiales
Family	: Pedaliaceae
Genus	: Sesamum L.
Species	: Sesamum indicum L[23].

PARTS USED:

Seeds and the fixed oil expressed from the seeds[10].

CHEMICAL CONSTITUENTS:

Neutral lipids, glycolipids and phospholipids(also in flowers); arginine, cystine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, tyrosine, Valine; α- and β-globuins; p-aminobenzoic acid, ascorbic acid, biotin, choline, folic acid, inositol, niacin, nicotinic acid, pantothenic acid, pyridoxine, riboflavine, Sesamol, thiamine,α- and β- tocopherols; galactose, glucose, lychnose, plantiose, raffinose, sesamose, sucrose and pentosans; Sesamin, sesamolin, sesamolinol, sesamol, undecadienal; 3-methylbutanol, octanol, phenol; 2,4-arachidic, hexadecenoic, linoleic, lignoceric, myristic, oleic, palmitic, phytic and stearic acids; astaxanthin(carotinoid), α-tocopherol in seeds; pedaliil (leaves); pinoresinol from the plant[24].

ACTION:

Seeds are laxative, emollient and demulcent; diuretic, nourishing, lactagogue and emmenagogue. Leaves are demulcent[10].

USES:

- Seeds are specially useful in piles, dysentery, scorpion sting and constipation, taken in decoction or as sweet-meats.
- A compound decoction of the seeds with linseed is used in cough and as an aphrodisiac. Ground to a paste with water, they are given with butter for bleeding piles; if it taken in large quantities, they are capable of producing abortion.
- Powdered seeds given internally in ammenorrhoea and dysmennorrhoea. Oils combination with other ingredients used in urinary troubles[10].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Hepatoprotective Activity of *Sesamum Indicum* Linn. Against Ccl_4-Induced Hepatic Damage In Rats Munish Kumar, Anjoo Kamboj, Sidhraj S. Sisodia

Abstract:

In present study, the hepatoprotective activity of ethanolic extracts of Sesamum indicum Linn. seeds were evaluated against carbon tetrachloride(CCL_4) induced hepatic damage in rats. The extract at two different doses (400mg/kg and 700mg/kg) was administered orally once daily. The substantially elevated serum enzymatic level of Serum Glutamate Oxaloacetate Transaminase (SGOT), Serum Glutamate Pyurvate Transaminase (SGPT), alkaline phosphatase (ALP), Acid phosphatase (ACP), Total Protein, Albumin and Total Bilirubin were restored towards normalization significantly by the extract. The biochemical observations were supplemented with histopathological examination of rat liver sections. The results of this study strongly indicate the *Sesamum indicum* Linn. Seeds have potent hepatoprotective action against carbon tetrachloride induced hepatic damage in rats[25].

2. **In vitro antioxidant activity of sesamum indicum seeds** H.s. vishwanath, k.r. anilakumar*, s.n.harsha, farhath khanum and a.s. bawa biochemistry and nutrition discipline, defence food research laboratory mysore 570011, india,

Abstract

The white and black varieties of *Sesamum indicum* were extracted in ethanol and the extracts were assayed for their antioxidant activities. The study revealed that both the extracts showed antioxidant activity. Respect to its abilility in inhibiting the lipid peroxidation. The hydroxyl radical scavenging by the white sesame extract was found to be more than that of black sesame. The white sesame seed extract was markedly a more potent scavenger of superoxide anion than the black one. The reducing power of the seed extracts was in substantiation with the antioxidant property. Fe++ chelation by the extracts was found to be high. It is concluded that the sesame seed extracts possess high antioxidant activity and that the white variety elicit better antioxidant activity than the black one[26].

3. Extraction, identification and phytochemical investigation of ethyl acetate and acetone fractions of aqueous extract of *sesamum indicum* seeds Repon kumer saha1, nabila tabassum amin, farhana hossain, md. Shakhawat hossain bhuiyan

Abstract

Objective:

To identify the isolated compounds and asses the phytochemical properties of the possible functional molecules for therapeutic uses by screening the ethyl acetate and acetone fractions of water extract derived from sesame seeds (*Sesamum indicum*) *in vitro*.

Methods*:*

Fractions of ethyl acetate and acetone were extracted from the aqueous extract of *S.indicum* seed by liquid-liquid solvent extraction method and was screened for possible phytochemical, antibacterial and biomedical activities using specific standard *in vitro* methods.

Results*:*

The ethyl acetate and acetone fractions were subjected to various identification tests to identify the presence of possible flavonoids compound. The ethyl acetate fraction

showed characteristic bands of flavonoids in the thin layer chromatography and ultra-violet spectroscopy. The ethyl acetate fraction was also potent antioxidant as it scavenged DPPH radical up to 70% at the concentration of 100µg/ml whereas the acetone fraction exhibited less activity. The ethyl acetate fraction showed moderate to good antimicrobial activities. In minimum bactericidal concentration test it exhibited better results in case of *S.aureus* than *E.coli*. The acetone fraction showed mild antimicrobial effect against some strains of microbes. The lethality index of the two fractions in brine shrimp indicated possible anticancer properties. The ethyl acetate fraction also showed stronger hemagglutination inhibition activity than the acetone fraction.

Conclusion:

The low activity of acetone fraction can be explained by the extraction procedure inefficiency. Since acetone is much soluble in water than ethyl acetate there was difficulty in separating the two layers that may had caused inadequate amount of polyphenols isolated by the procedure. Ethyl acetate fraction showed some potential therapeutic effects like antioxidant activity, antimicrobial activity, cytotoxic activity leading to anticancer property and hemagglutination inhibition activity indicating antiviral application. So, the isolated compound in this fraction may be used as future therapeutic tools if further therapeutic investigations are carried out[27].

4. Acute and sub-acute oral toxicity studies of ethanolic extract of sesamum indicum seeds (Linn.) In wistar albino rats Palanisamy Bhuvaneswari, Shanmugasundaram Krishnakumari

Abstract

The present study was undertaken to evaluate the acute and sub-acute toxicity of ethanolic extract of Sesamum indicum (Linn.). In acute toxicity studies, the rats were administered with a single dose of Sesamum indicum extract from the range of 100 mg/kg body weight to 2000 mg/kg body weight. In subacute toxicity studies, the experimental animals were treated with ethanolic extract of Sesamum indicum seeds orally at a dose ranging from 100, 200, 300, 400 and 500 mg/kg body weight for 21consecutive days and various haematological, biochemical and histological variables were studied for safety evaluation. The changes in the biochemical parameters (protein, urea, uric acid and creatinine), haematological parameters (Hemoglobin, RBC and

WBC), liver marker enzymes (AST, ALT and ALP), antioxidant enzymes (SOD and catalase) and lipid peroxidation were statistically insignificant when compared with control animals. Histopathological examinations of the liver tissue doesnot reveal any pathological lesions. These results indicate that the plant extract is non-toxic, at a dose of 500 mg/kg body weight[28].

அமுக்கிராக்கிழங்கு

வேறு பெயர்:

அமுக்கிரி, அமுக்குரவி, அமுக்குரவு, அமுக்கினாக்கிழங்கு, அசுவகந்தம், அசுவகந்தி, அசுவம், இருளிச்செவி, கிடிச்செவி, வராககர்ணி.

பயன்ப்படும் உறுப்பு - இலை, விதை, வேர்(கிழங்கு)

சுவை - **(யாவும்) கைப்பு**

வீரியம் - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

இலை - வெப்பகற்றி

காய் - சிறுநீர்பெருக்கி

கிழங்கு - உடற்றேற்றி
ஆண்மைபெருக்கி
வீக்கமுருக்கி
சிறுநீர்பெருக்கி
உடல்வெப்பகற்றி

குணம்:

கொஞ்சந் துவர்ப்பாங் கொடியகயம் சூலையரி
மிஞ்சுகரப் பான்பாண்டு வெப்புதப்பு - விஞ்சி
முசுவுறு தோடமும்போ மோகமன லுண்டாம்
அசுவகந் திக்கென் றறி.

அகத்தியர் குணவாகடம்

இக்கிழங்கு கயம், வளிக்கூட்டங்கள், கரப்பான், சுரம், வீக்கம் இவைகளைப் போக்கும்; பசித்தீயுண்டாக்கும்.

வழக்கு:

- அமுக்கினாங்கிழங்கை, பொடி நெய் முதலியன செய்து பயன்ப்படுத்தினால், உறுதி, அழகு, நீண்ட ஆயுள் முதலியவைகள் உண்டாகும்.
- அமுக்கினாங்கிழங்கைப் பச்சையாய்க் கொண்டுவந்து, பசுவின்நீர் விட்டரைத்துக் கொதிக்கவைத்து, (கழலை) கிரந்தி,(கழுத்துக் கழலை) கண்டாமாலை, வீக்கம், இடுப்புவலி இவைகளுக்குப் பற்றிட, இவைகள் விலகும்.
- இதைச் சுக்குடன் சேர்த்து வெந்நீர்விட்டரைத்து, வீக்கங்களுக்குப் போடக் கரையும். கிழங்கை அரைத்து, மேகக்கட்டி, நோயுடன் கூடிய வீக்கம், புண் இவைகட்குப் பூசலாம்[7].

சேரும் மருந்துகள்:

- மகாஏலாதி சூரணம்
- திப்பிலி இளகம்
- நீரடிமுத்து வல்லாதி
- மகா வில்வாதி இளகம்
- வல்லாதி இளகம்[20]
- இரசகெந்தி மெழுகு
- கந்தக இரசாயணம்
- மகா ஏலாதி குளிகை[30]

WITHANIA SOMNIFERA

It is perennial shrub, found in waste land, cultivated fields and open grounds throughout the India. It is also cultivated in certain areas of Madhya Pradesh and Rajasthan. Roots are collected in winter. It grows in Mullai and Marutham thinai[30].

SYNONYMS:

Sanskrit : Ashvagandha, Ashvakandika, Ashvaroha, Ashvavarshaka, Balada, Balaja, Gandhapatri, Haya, Kala, Kambuka, Kamrupini, Kushthagandha, Kushthagandhini, Palashaparni, Priyakari, Punya, Pushtida, Pushtipavira, Shyamala, Turagagandha, Turagi, Vajigandha, Vajikari, Vajini, Varada, Varagatrakari, Varahakarni, Varahapatri, Vataghni. **Punjabi**: AK, Aksan, Asgand, Asgandnagori,

Isgand. **Arabic**: Kaknajehindi. **Bengali**: Ashvaganda, Asvagandha. **Malayalam**: Amukkiram, Pevetti. **Marathi**: Askandha, Kanchuki, Tilli. **Telugu**: Asvagandhi, Dommadolu, Penneru, Pillivendramu, Vajigandha. **Tamil**: Amukkira, Asubam, Asuvagandhi[31].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida
Order	: Solanales
Family	: Solanaceae
Species	: Withania somnifera L[32].

PARTS USED:

Fruits, Seeds, Leaves and root[33].

CHEMICAL CONSTITUENTS:

Withanolides- withaferinA, withanolides I, II, IIIA, C, D, E, F, G, H, I, J, K, L, M, WS-I, P and S, Withasomidienone, Cuscohygrine, Anahygrine, Tropine, Pseudotropine, Anaferine, Isopellatierine, 3-tropyltigloate[30].

ACTIONS:

Fruits and Seeds: Diuretic; leaves – antipyretic, anthelmintic. Root – Adaptogenic, alterative, aphrodisiac, deobstruent, diuretic and tonic[33].

USES:

- Bruised leaves and ground root are locally applied in carbuncles, scabies, painful swellings and ulcers;

- Roots are useful in cough, dropsy, hiccup, leucorrhoea and menstrual troubles, restores loss of memory; used in cases of nervous exhaustion, spermatorrhoea and senile debility.
- Powder with equal parts of ghee and honey beneficial in impotency or seminal debility[33].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Toxicity of Withania Somnifera Root Extract in Rats and Mice

Abstract

Alcohol Extracts From The Roots Of W. Somnifera ('Ashwaganda' In Sanskrit) Were Screened For Their Acute (24 H) Toxicity In Conventional Swiss Albino Mice and Subacute Toxicity (30 Days) In Wistar Rats. A Single Intraperitoneal Injection Of 1100 Mg/Kg Of The Extract In Mice Did Not Produce Any Deaths Within 24 H, But Small Increases Led To Mortality. The Ld50 Value Was Calculated As 1260 Mg/Kg Body Wt. Subacute Toxicity Studies With Repeated Injections Of Ashwagandha Extract At A Dose Of 100 Mg/Kg Body Wt. (= 1/12 Ld50) For 30 Days In Wistar Rats Of Either Sex Did Not Result In Any Mortality Or Changes In Peripheral Blood Constituents. However, Significant Reductions In The Weights Of Spleen, Thymus and Adrenals Were Observed In Male Rats At The End Of The Experiment. The Acid Phosphatase Content Of Peripheral Blood In Both Sexes Showed A Significant Increase From Control, While Other Biochemical Parameters Determined In The Study Were In The Normal [Range34].

2. *Withania somnifera* extract reduces the invasiveness of MDA-MB-231 breast cancer and inhibits cytokines associated with metastasis Kamel F. Khazal1, Donald L. Hill

Aim:

The aim was to examine the anti-proliferative effect of a *Withania somnifera* (WS) root extract in cell cultures and nude mouse xenografts of breast cancer cell line MDA-MB-231.

Methods:

WS root extract was used to treat tumor cells at concentrations up to 100 μg and for nude mouse experiments, the mice received daily WS at 300 mg/kg by oral gavage for 8 weeks.

Results:

The WS extract reduced viability of MDA-MB-231 cells by 75% and 88% after exposure of the cells to 50 and 100 μg/mL, respectively, compared to vehicle-treated controls. WS extract caused a dose-dependent increase in the percentage of cells in the sub-G1 phase compared to untreated controls by 6% and 10% after exposure to 25 and 50 μg/mL WS extract, respectively. WS extract also inhibited proliferation of xenografted MDA-MB-231 cells. The WS extract caused reductions in xenografts size by 60% compared to the untreated control after 8 weeks of treatment. Six of ten mice in the control group showed tumor metastasis to the lung, whereas there was none in the mice treated with the WS extract. At the gene level, WS caused a 75% reduction in chemokine CCL2 expression ($P < 0.05$) in the xenografted tumors of the treated mice.

Conclusion:

WS root extract inhibited proliferation of breast cancer cells *in vitro* and *in vivo* and significantly reduced expression of the cytokine, CCL2. These results warrant further studies to assess the underlying molecular mechanism of the anti-tumor activity of the WS extract in breast cancer[35].

3. Anticancer activity of acetone and methanol extracts of Terminalia chebula Retz and Withania somnifera (Linn.) Dunal on HeLa cell line Mary Grace Jinukuti and Archana Giri *Centre for Biotechnology, Institute of Science and Technology,Jawaharlal Nehru Technological University Hyderabad, Kukatpally, Hyderabad-50085, Telangana, India*

Abstract

Terminalia chebula Retz (Combretaceae) and Withania somnifera (Linn.) Dunal (Solanaceae), which are native to India, possess immense therapeutic and pharmacological potential. Acetone and methanol extracts of T.chebula fruit and W. somnifera root were used to determine their anticancer activity towards HeLa cell line. The viability of cells was determined by MTT (3, 4, 5-dimethylthiazol-2-yl)-2-5-diphenyltetrazolium bromide) assay, which is based on the reduction of MTT by mitochondrial dehydrogenase of intact cells to a purple formazan product. Acetone extract of T. chebula (IC50 at 0.113 mg/ml) and methanol extract of W. somnifera (IC50 at 0.138 mg/ml) showed effective anticancer activity compared to that of cisplatin as control. The presence of polyphenolics in acetone extract of T. chebula and methanol

extract of W.somnifera were determined using HPLC method. HPLC analysis indicated the presence of catechin, vanillic acid, quercetin and sinapic acid in acetone extract of T. chebula and vanillic acid, quercetin and sinapic acid in methanol extract of W. somnifera, which are wide spread in plants and their products play a vital role in human diet[36].

4. Anticancer Activity of *Withania Somnifera (Leaves)* Flavonoids Compound

Rajeev Nema, Sarita Khare, Parul Jain and Alka Pradhan Sarojini Naidu Government Girls Post Graduate (Autonomous) College, Shivaji Nagar, Bhopal, India.

Abstract

In this research article make known on *Withania somnifera* (Ashwagandha) as Medicinal plants have therapeutic potential due to the presence of natural antioxidants functioning as reducing agents, free radical scavengers and quenchers of singlet oxygen. And this article also determines the use of *Withania Somnifera (leaves)* Polyphenolic Compound activity on MCF-7, A549 and PA-1 cancer cell line (breast, lung and ovary respectively). By providing a scientific basis the study can be made conventional to evaluate its constituents (natural product) to determine which of *Withania Somnifera (leaves)*, would facilitate further study as potential new anticancer agents or lead to new anticancer compounds. Hydro alcoholic (1:1) sample of *Withania Somnifera (leaves)* were prepared and tested for their cytotoxic activities against cancer cell lines (MCF7, A549and PA1) with standard Doxorubicin. The most essential reason of this study is to estimate cytotoxicity of certain important Indian medicinal plants with facilitate of MTT assay. Concentrations are set of each plant extract which are 100 µg/ml, 10 µg/ml , 0.1 µg/ml, 0.01 µg/ml and 5-10×10 3 cells/ml are taken into each well which are exposed to different Concentrations of *Withania Somnifera (leaves)* for 96 hr and then treated with MTT. For MTT absorbance in use at 570 nm. From IC50 values of MTT assay of *Withania Somnifera (leaves)* for MCF7, A549 and PA1 cancer cell lines, from this it may conclude that *Withania Somnifera (leaves)*shows efficient cytotoxicity on MCF-7 (10 ± 1 µg) than PA-1 (13± 1 µg) and A-459 (11± 1 µg) cancer cell line[37].

பறங்கிப்பட்டை

வேறு பெயர்:

மதுஸ்மிகம், மதுஸ்மீகி, சீனப்பட்டை, பறங்கிச்சக்கை.

பயன்ப்படும் உறுப்பு - கிழங்கு

சுவை - இனிப்பு

தன்மை - தட்பம்

பிரிவு - இனிப்பு

செய்கை:

` உடற்றேற்றி

மேகப்பிணிவிலக்கி

காமம்பெருக்கி

தூய்மையாக்கி

குணம்:

தாகம் பலவாதந் தாதுநட்டம் புண்பிளவை

மேகங் கடிகிரந்தி வீழ்மூலந் - தேகமுடன்

குட்டை பகந்தமேற் கொள்வமனம் போம்பறங்கிப்

பட்டையினை யுச்சரித்துப் பார்.

இதனால் நீர்வேட்கை, பற்பல வளிநோய், புண், பிளவை, நீரிழிவு, கடிவிடம், சிரங்கு, மூலமுளை, முடவாதம், குறை நோய், ஐயம் மகரந்தப்புண், வாந்தி இவை நீங்கும். ஆண்மை உண்டாகும்[7].

சேரும் மருந்துகள்:

- இரசகெந்தி மெழுகு
- பறங்கிப்பட்டை இரசாயணம்
- பறங்கிப்பட்டை பதங்கம்
- குக்கிலாதிச் சூரணம்
- மகா வில்வாதி இளகம்
- நீரடிமுத்து வல்லாதி[30]

SMILAX CHINA

A deciduous climber with sparsely prickled or unarmed stem. It is imported from china and Japan[30].

SYNONYMS:

Sanskrit: Dwipautra; Wacha; Madhusnuhi. **English**: China Root; Bamboo Briar Root. **Hindi, Bengali, & Punjabi**: Chobchini. **Tamil**: Parangichekkai; Parankippattai; shuk-china; parangi. **Telugu**: Pirangi-chekka; Gali-chekka. **Malayalam**: china-paivu or pairu. **Chinese & Japanese**: Too-fub; **Arabic**: Kasbussini; kashab-chinae[10].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida
Order	: Liliales
Family	: Smilacaceae
Genus	: Smilax L.
Species	: Smilax china L[38].

CHEMICAL CONSTITUENTS:

Sarasaponin, Parallin, β-Sitosterol, stigmasterol and their glucosides, daucosterol, isoseryl-S-methyl-cysteamine, sulphoxide and dihydrokaempferol-5-O-β-D-glucoside[30].

ACTIONS:

Tuber has anti-inflammatory, anticancer and anticoagulation activities. It also contains demulcent, diaphoretic, stimulant, alterative, antisyphillitic, sudorific, tonic and aphrodisiac[39].

USES:

China root was once considered useful in Europe for venereal and rheumatic disorders in the same way as sarsaparilla. Though it is no longer used in indigenous medicine in china, it continues to be used in India for the treatment of Venereal diseases, rheumatism and chronic skin infections[39]

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1.Sarsaparilla (Smilax Glabra Rhizome) Extract Inhibits Migration and Invasion of Cancer Cells by Suppressing TGF-β1 Pathway Tiantian She1, Chuanke Zhao1, Junnan Feng1, Lixin Wang1, Like Qu1, Ke Fang1, Shaoqing Cai2, Chengchao Shou1*

Abstract

Sarsaparilla, also known as Smilax Glabra Rhizome (SGR), was shown to modulate immunity, protect against liver injury, lower blood glucose and suppress cancer. However, its effects on cancer cell adhesion, migration and invasion were unclear. In the present study, we found that the supernatant of water-soluble extract from SGR (SW) could promote adhesion, inhibit migration and invasion of HepG2, MDA-MB-231 and T24 cells in vitro, as well as suppress metastasis of MDA-MB-231 cells in vivo. Results of F-actin and vinculin dual staining showed the enhanced focal adhesion in SW-treated cells. Microarray analysis indicated a repression of TGF-β1 signaling by SW treatment, which was verified by real-time RT-PCR of TGF-β1-related genes and immunoblotting of TGFBR1 protein. SW was also shown to antagonize TGF-β1-promoted cell migration. Collectively, our study revealed a new antitumor function of Sarsaparilla in counteracting invasiveness of a subset of cancer cells by inhibiting TGF-β1 signaling[40].

2. Antioxidant and Antimicrobial Activities of Smilax china L. Leaf Extracts Hye-Kyung Seo, Jong-Hwa Lee, Hyun-Su Kim, Chang-Kwon Lee, and Seung-cheol Lee

Abstract

Antioxidant and antimicrobial activities of Smilax china L. leaf extracts obtained with methanol, ethanol, acetone, and water were investigated. Antioxidant activity was evaluated by determining the DPPH radical scavenging activity, ABTS radical scavenging activities, total phenol content (TPC), and reducing power (RP). The highest

DPPH, ABTS radical scavenging activity, and RP were found in the ethanol extract, which also showed the highest TPC (105.81±0.48 μg gallic acid equivalents/mL). The antimicrobial activity of all the extracts against food borne microorganisms was determined by paper disc method. All the extracts inhibited the growth of Listeria monocytogenes, Staphylococcus aureus, and Salmonella Typhimurium, however, no antimicrobial activity was observed against Escherichia coli O157:H7. The results indicated that Smilax china L. possessed antioxidant and antimicrobial substances, and suggested that the ethanol extract can be applied into food and cosmetic industry[41].

3. Effect of *Smilax china* L.-containing serum on the expression of POLD1 mRNA in human hepatocarcinoma SMMC-7721 cells BO CAO1, ZIHAN ZHANG1, YUQIN ZHANG1, JIAQUAN LI2, GANG LIANG3 and JIANGHONG LING1

Abstract.

Bock greenbrier rhizome, also known as *Smilax china* L. rhizome, induces heat clearing and detoxification and dispels wind dampness. Additionally, this Chinese medicine has been shown to function as an anticancer compound in various types of cancer. The aim of the present study was to investigate the mechanism by which *Smilax china* L.- containing serum suppresses SMMC-7721 human hepatocellular carcinoma (HCC) cell growth as well as to determine its effect on the expression of DNA polymerase δ catalytic subunit gene 1 (POLD1). SMMC-7721 human HCC cells were cultured with serum containing various amounts of *Smilax china* L. for 24 h. The cells were also cultured in blank serum or serum containing a drug used in Western medicine (cyclophosphamide; CTX) as a positive control. HCC cell growth and proliferation were determined using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. Cell cycle distribution and apoptosis were analyzed by flow cytometry, and the expression of POLD1 mRNA was detected by quantitative polymerase chain reaction (PCR). The number of cells following culture with *Smilax china* L.-containing serum was observed to be decreased. There was significant growth inhibition in the *Smilax china* L.-treated cells (shown in the high concentration serum group, volume fraction 30%), which was significantly different from the inhibition observed in the control group ($P<0.05$). Among the various cell cycle phases following culture, the percentage of cells in the S phase was significantly increased, and the percentage of cells in the G0/G1 phase was decreased; these percentages were significantly different from

the percentages of the control cells ($P<0.05$). The results obtained following quantitative PCR showed a significant reduction in POLD1 expression. *Smilax china* L.-containing serum directly suppressed cell growth and induced the apoptosis of human HCC cells. However, the number of cells in the S phase was reduced. This mechanism is suggested to be associated with the suppression of POLD1 expression[42].

வாலுளுவை

வேறு பெயர்:

கங்குணி, மால்கங்குணி, அதிபறிச்சம்.

பயன்ப்படும் உறுப்பு - இலை, விதை, நெய்.

சுவை - கைப்பு

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

காமம்பெருக்கி

வெப்பமுண்டாக்கி

உடற்றேற்றி

வியர்வைப்பெருக்கி

நாடியுரமாக்கி

குணம்:

வயிற்றுக் கடுப்புவலி மாறாக் கிராணி
பயித்தியங் காசமல பந்தஞ்- சயிக்கவொணாச்
சூதிகா வாதமும் போந் தொல்வா லுளுவைவிதைக்
காதிநவ சித்தர் மொழி யாம்.

அகத்தியர் குணவாகடம்

வாலுளுவைக்கு, வயிற்றுக் கடுப்பு, கடுப்புடன் கூடிய குருதிக் கழிச்சல், இருமல், அனல், ஊசியால் குத்துவதுபோல உண்டாகும் கைகால் நீத்தல் போம், வயிற்றை வலிக்கும்.

வழக்கு:

- வித்தைப் பசுவின் நீர் விட்டரைத்து, அந்நீரிலேயே குழப்பி, பக்குடனுள்ள புண்களுக்குப் பூசத் தீரும்.
- விதையைக் களி கிண்டி நாட்பட்ட புண்களுக்கு வைத்துக்கட்ட, வெகு விரைவில் உலரும்.

- விதையைப் பொடி செய்து, நாள் ஒன்றுக்கு 2-3 முறை 1-2 கிராம் எடைவீதம் கொடுத்துவர, இருமல், கடுப்புடன் கூடிய குருதிக் கழிச்சல், வயிற்றுக்கடுப்பு, பெரும்பாடு, அழல் இவை தீரும். இதையே பாலில் காய்ச்சியுண்ண மேனியுண்டாகும்[7].

சேரும் மருந்துகள்:

- சிவனார் வேம்பு குழித்தைலம்
- கருடன் கிழங்கு எண்ணெய்[30]
- சரபராச மாத்திரை
- இஞ்சி இளகம்
- கடுக்காய் இளகம்
- வல்லாதகி இளகம்[20].

CELASTRUS PANNICULATUS

It is mostly found in all over the hilly parts of the country Andhra Pradesh, Karnataka, Goa, Maharashtra, Gujarat, Madhya Pradesh, Uthra Pradesh, Arunachala Pradesh, Punjab and Himachal Pradesh[39].

SYNONYMS:

Sanskrit – Vanhiruchi; Katumbhi; kanguni. English – Staff Tree, Intellect tree, Black oil plant. Bengali – Kongagaidh, Malkangni, Sankhu. Gujarati – Malkangana. Hindi – Malkangani, Malkungi. Malayalam – Palulavam, Valulavam. Tamil – Valulavai, Kakotarici. Telugu – Maner tiga, Dati chettu[10].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida

Order : Celastrales

Family : Celastraceae

Genus : Celastrus

Species : Celastrus paniculatus[38].

CHEMICAL CONSTITUENTS:

Major: Fatty oil (~42-45%) with palmitic (~9%), oleic (19%), linoleic (~10%), and linolenic (~5%) acids and their glycerols esters mainly α, ά – dipalmitoylglycerol.

Minor: A number of sesquiterpene polyesters (mainly malkangunin) esterified with one or more acetic, benzoic, β-furanoic and β-nicotinic acids; sesquiterpene alkaloids viz., celapanin, celapanigin and celapagin; quinine-methide and phenolic[43]

ACTION:

- Oil is rubefacient[10]; seeds are alterative, stimulant and nervine; seeds and oil stimulate intellect and sharpen memory.
- Seed oil showed anti-inflammatory and antimicrobial activity. Petroleum ether extract showed antianxiety activity. Aqueous extract of seed has cognitive enhancing properties and an antioxidant affect might be involved[39].
- Activities in animal models. It is also known to possess hypolipidaemic, antiatherosclerotic, analgesic, anti-inflammatory and antifertility activities. The drug is belived to enhance the memory and learning process and its ability to decrease the turnover of central monoamines may have some role to play[43].

USES:

- Decoction of seeds with or without aromatics is given in rheumatism, gout, paralysis and leprosy.
- They are also used to cure sores, ulcers, rheumatism and gout. The seed oil is used in scabies, body and rheumatic pains, wounds, eczema, beriberi and paralysis.
- It is known as Magzsudhi (Brain clearer) and belived to promote intelligence[10].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. *Celastrus paniculatus*, an endangered indian medicinal plant with miraculous cognitive and other therapeutic properties: Neha arora and shashi pandey-rai

Abstract

Celastrus paniculatus is an Indian medicinal plant which has been used for thousands of years in the traditional Ayurvedic system of medicine. It is fast gaining importance in the primary healthcare systems as well as in herbal drug formulations. Oil obtained from the seeds of the plant is reported to be highly beneficial in stimulating intellect and sharpening the memory. It also acts as a potential nervine tonic, rejuvenator and an anti-depressant. Moreover, the plant possesses a strong antioxidant as well as free radical scavenging activity. *C. paniculatus* has also been exploited for its potential role in the management of neurodegenerative diseases and other neuronal disorders such as Alzheimer's disease. Oil being a powerful stimulant for neuromuscular system is also used for the treatment of rheumatism, gout and paralysis. This review aims at exploring the detailed phytochemical composition, pharmacological properties as well as therapeutic applications of different parts of *C. paniculatus*[44].

2. **Screening of endophytic fungi isolated from *celastrus paniculatus* for antimicrobial potential Priyatama v. Powar1 and dr. K. S. Patil 2**

Abstract

Celastrus paniculatus Willd (Celastraceae) is a rich source of alkaloids and triterpenoids; which is mainly used as aphrodisiac, brain tonic and is effective in leprosy, leucoderma, and paralysis. Total ten Endophytic fungi were isolated by incubating the plant material (Leaf Explant) on Potato Dextrose Agar supplemented with Streptomycin (250 mg/l) at 27± 2o C. The isolated fungal strains were identified by studying their morphological and microscopical characters. The fungi were fermented and extracted with Ethyl Acetate and Acetone; and screened for Antimicrobial Activity. Different bioactivities were found to be present in different taxa. Total ten strains of endophytic fungi were tested for antimicrobial activity out of which 7 strains showed antimicrobial spectra while remaining strains were inactive[45].

3. Anti-Alzheimer and Antioxidant Activity of *Celastrus paniculatus* Seed Badrul Alama, Ekramul Haqueb,

Abstract

The crude methanolic extract of the seeds of *Celastrus paniculatus* along with its organic soluble fractions were tested for their possible antioxidant and antialzheirmer (AD) activity. The extracts showed prominent DPPH free radical scavenging activity, inhibiting activity of authentic peroxynitrite (ONOO-) and inhibition of total reactive oxygen species (ROS) generation. In DPPH radical scavenging assay, the EtOAc fraction showed the highest activity with a IC50 value of 25.92±1.02 µg/ml whereas aqueous fractions had no activity at all within the tested concentration. Scavenging of the authentic ONOO- system, all extract/fractions showed good activity and among them, EtOAc fraction had the highest activity with a IC50 value of 15.79±0.18 µg/ml. EtOAc fraction also showed significant (p<0.001) inhibitory activity against the total ROS generation which was almost similar with that of the positive control Trolox (IC50 16.79±0.19µg/ml). All extract/fractions exhibited statistically significant (p<0.001) cholinesterases (ChEs) inhibitory effects with IC50 values ranging between 134.7-227.5 µg/ml for AChE and 209.6-562.1 µg/ml for BChE[46].

4. Effect of Jyotishmati (Celastrus paniculatus) seeds in animal models of pain and inflammation Yogesh A. Kulkarni,1 Sneha Agarwal,1 and Mayuresh S. Garud1

Abstract

Background:

Jyotishmati, scientifically known as Celastrus paniculatus Wild (Celastraceae) is one of the most important medicinal plants in Ayurveda. The plant has shown significant pharmacological activities like anti-arthritic, wound healing, hypolipidaemic, and antioxidant. Objective: To study possible effects of alcoholic extract of Celastrus paniculatus seeds (AlcE) in experimentally induced pain and inflammation in mice. Materials and Methods: The antinociceptive activity was evaluated in Swiss albino mice by tail immersion, hot plate, and acetic-acid-induced writhing tests at doses of 250, 500, and 1,000 mg/kg. Anti-inflammatory activity was evaluated in model of carrageenan-induced acute plantar inflammation in Wistar rats. Results: In tail immersion test, AlcE showed significant (P < 0.05) increase in tail withdrawal response at dose of 250 mg/kg

with maximum possible effect of 15.71%. The maximum possible effect of 23.32% and 30.16% ($P < 0.001$) was seen at dose of 500 and 1000 mg/kg at 3 hours after administration of extract, respectively. In hot plate test, increase in paw licking time was reported at dose of 500 and 1000 mg/kg. AlcE (1,000 mg/kg) showed maximum response (6.23 ± 0.46) when compared with control (3.20 ± 0.18) at 90 min. In acetic acid induced writhings, AlcE at dose of 250, 500, and 1,000 mg/kg body weight showed 32.35%, 49.01%, and 58.82% inhibition in writhings, respectively. AlcE treated animals (500 and 1,000 mg/kg) showed significant decrease in paw edema at 3 hours and 4 hours, when compared with control animals. Conclusion: Jyotishmati seed extract possesses significant antinociceptive and anti-inflammatory activity[47].

திப்பிலி

வேறு பெயர்:

ஆர்கதி, உண்சரம், உலவைநாசி, காமன், குடாரி, கோலகம், கோலி, கோழையறுக்கி, சரம், சாடி, துளவி, மாகதி, கனை, சௌண்டி, தண்டுலி, கணம், கலினி, பாணம், பிப்பிலி, வைதேகி, அம்பு, ஆதிமருந்து.

திப்பிலி இரு வகை உண்டு, ஒன்று அரிசித் திப்பிலி, மற்றொன்று யானைத் திப்பிலி.

பயன்ப்படும் உறுப்பு - காய், அரிசி

சுவை - இனிப்பு

தன்மை - தட்பம்

பிரிவு - இனிப்பு

குணம்:

இருமல் குன்மம் இரைப்பு கயப்பிணி
ஈளை பாண்டு சந்யாசம் அரோசகம்
பொருமல் ஊதை சிரப்பிணி மூர்ச்சைநோய்
பூரிக் குஞ்சல தோடம் பீலிகமும்
வரும லப்பெருக் கோடு மகோதரம்
வாதம் ஆதிமுத் தோடஞ் சுரங்குளிர்
பொருமாலைப்புரி மேகப் பிடகமும்
பேருந் திப்பிலிப் பேரங்குரைக்கவே.

இதனால் இருமல், குன்மம், இரைப்பு, ஐயப்பிணி, ஈளை, பாண்டு, மயக்கம், சுவையின்மை, பொருமல், தலைவலி, மூர்ச்சை, நீர்றேற்றம், தொண்டைநோய், மூக்கு - காது - கண் நோய்கள் , புழு நோய்கள் ஆகியவை நீங்கும்.

வழக்கு:

- திப்பிலிப்பொடி மூவிரல் அளவை, கம்மாறு வெற்றிலைச்சாறும், தேனும் ஒரளவு கலந்ததில் உட்கொள்ள, கோழை, இருமல், சுரம் தீரும்.
- திப்பிலிச் சூரணம் கால் பலத்தை 350 மி.லி. பசுவின் பாலில் விட்டுக் காய்ச்சிச் சாப்பிட்டுவர, இருமல், வாய்வு, மூர்ச்சை, முப்பிணி இவைபோம்.

- திப்பிலியைத் தூள் செய்து ஒரு மாதம் வரைக்கும் தேனில் குழைத்துச் சாப்பிடத் தேமல் நீங்கும்[7].

சேரும் மருந்துகள்:

- இலிங்க மெழுகு
- வில்வாதி இலேகியம்[29]
- குன்மகுடோரி மெழுகு
- சிவனார் அமிர்தம்
- பால சஞ்சீவி மாத்திரை
- திப்பிலி இரசாயணம்[30]

PIPER LONGUM

It Occurs in hotter parts of India from central Himalaya to Assam. Upto lower hills of West Bengal and evergreen forest of Western ghats as Wild, and also cultivated in North East and many parts of the South. It grows in kurinchi thinai[30].

SYNONYMS:

Sanskrit: Chanchala, Chapala, Dantakapha, Eranda Gonamika, Granthika, Kagophale, Kana, Kati, Katubuji, Kaola, Kolya, Korangi, Krikala, Krishna, Krishnapippali, Magadha, Magadhi, Magadhobhava, Pippali, Shaundi, Shyama, Sukshmatandula, Tiktatandula, Trikana, Upakulya, Ushana, Vaidehi**,. English:** Long pepper. **Germany**: Langer pfeffer**. Hindi:** Gazpipal, Pipal, Pipar, Piplamul, Pipli, Pipulmul. **Gujarati:** Pipper, Pipli Telugu- Naga-Modi, Pippali, Pippalu, Tulu, Ippali. **Tamil** : Argadi, Atti, Kalidi, Kalini, Kaman, Kanna, Kattuttippilikodi, Kindigam, Kirandigam, Kolagam, Magadai, Pippli, Sabala, Sadi, Salani, Salini, Samilagi, Sanjalai, Savundi, Sayini, Sirumulagam, Sirumulam, Tippli, Triandigam, Tunavi, Ulagulam, Vayavetti. **Malayalam:** Chapala, Kana, Kattutipali, Magadhi, Pippali, Tippli. **Arabic:** Darfilfil. **Bengali**: Piplamor, Piplamul, Pipli, Pipul. **Punjabi**: Darfilfil, Filfildaraz, Magzhpipal, Pipal, Piplamul[31].

TAXONOMICAL CLASSIFICATION:

Kingdom : Plantae

Subkingdom : Viridiplantae

Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida
Order	: Piperales
Family	: Piperaceae
Genus	: Piper
Species	: Piper longum[38]

CHEMICAL CONSTITUENTS:

The spikes contain volatile oil, resin, Piperine and Piperlonguminine alkaloids. Fruit contain alkaloids piperine and Piplartine[39].

ACTIONS:

- The fruit has bitter, hot, sharp taste; carminative, tonic to the liver, stomachic, emmenagogue, abortifacient, aphrodisiac, haematinic, diuretic[10].
- Acetone and petroleum ether extracts showed antioxidant activity in testis of male albino rats.

USES:

- It is given for bronchial asthma, insomnia, jaundice and viral hepatitis. With ginger and honey it is given in rheumatism and as a nervine tonic.
- The fruits and roots are used for cough, bronchitis, asthma, etc., It is used as snuff in coma and drowsiness and internally as carminative, as sedative in insomnia and leprosy.
- It is used as cholagogue in obstruction of bile duct and gallbladder, as emmenagogue and abortifacient. It is also used as anthelmintic, dysentery and leprosy[39].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Anti-mycobacterial activity of *Piper longum* L. fruit extracts against multi drug resistant *Mycobacterium* Spp. Chandan Singh1, Santosh K. Singh1*, Gopal Nath2 and N.P. Rai3 *Corresponding author: Santosh K. Singh

Abstract

A long tradition of using pepper as to fight against several ailments by the local tribal people is still in the practice, in many parts of the rural India. So utilizing this tribal knowledge base for this highly medicinal plant, an attempt was made to isolate some novel natural bioactive Compounds with potential activity against multidrug resistant (MDR) *Mycobacterium*. A bioassay guided fractionation of Pippali (*Piper longum* L.) was performed in five different organic solvents and their activities were monitored against different pathogenic bacteria including MDR *Mycobacterium*. Different fractions were screened for the bioactivity against *Mycobacterium,* and the structure of bioactive compound was characterized with H1 and C13 NMR. An ethyl acetate fraction of Pippali extract was found active against *M. smegmatis*(3000µg ml-1) and *M. tuberculosis* (39 µg ml-1). It also shows very significant activity against other bacterial strains like *E.coli* (152 µg ml-1), *Staphylococcus aureus* (14 µg ml-1), *Salmonella typhi* (180 µg ml-1), *Enterococcus faecalis* (15 µg ml-1), and *Pseudomonas aeruginosa* (52µg ml-1). This fraction of ethyl acetate was then purified and characterized as piperine [5-(1, 3-benzodioxol-5-yl)-1-piperidin-1-ylpenta-2,4-dien-1-one], a well known alkaloid from this plant. Bioactivity guided fractionation concludes that Piperine is the only active ingredients in various fractions of fruit extract evaluated for antibacterial activity. Fraction having piperine has significant activity against multi drug resistant strains of *Mycobacterium* spp. than other purified fractions of fruit extract. The current finding encourages us to develop new alternative medicine that includes piperine alone and/or in combination with other drugs to fight against the drug resistance among Mycobacterial strains[48].

2. A REVIEW ARTICLE ON PIPPALI (PIPER LONGUM LINN) Ashalatha M1, Rekha B Sannappanawar2

Abstract

Piper longum linn is one of the important medicinal plant of the family piperaceae.being one among the constituent of *trikatu, panchakola* etc, very widely used in *Ayurveda* for the treatment of various disorders. The *nirukti* of word *Pippali* signifies its action in maintaining total health and also in *dhatu poshana and poorana.*1 *Pirpathi paalayathi purusham purayathi cha ksheenan dhatunithi pru palanapuranayo.(Bh. N)* In the Ayurvedic Formulatary of India, *Pippali* is being used in 324 formulation. It is used as *prakshepaka dravya* in many formulations. It is highly valued from time immemorial because of its vast medicinal properties. It is extensively used as Antiinflammatory, cough suppressor, antibacterial, insecticidal, antimalarial, CNS stimulant, antitubercular, anti- helminthic, hypoglycaemic, antispasmodic, antigiardial, immunostimulatory, hepatoprotective, analeptic, antinarcotic, antiulcerogenic activity. The present article provides all necessary information regarding its classical literature[49]

3. **Immunomodulatory and antitumor activity of *Piper longum* Linn. and piperine** Author links open the author workspace. E.S Sunila, Author links open the author workspace. G Kuttan

Abstract

Alcoholic extract of the fruits of the plant *Piper longum* and its component piperine was studied for their immunomodulatory and antitumor activity. Alcoholic extract of the fruits was 100% toxic at a concentration of 500 μg/ml to Dalton's lymphoma ascites (DLA) cells and 250 μg/ml to Ehrlich ascites carcinoma (EAC) cells. Piperine was found to be cytotoxic towards DLA and EAC cells at a concentration of 250 μg/ml. Alcoholic extract and piperine was also found to produce cytotoxicity towards L929 cells in culture at a concentration of 100 and 50 μg/ml, respectively. Administration of alcoholic extract of *Piper longum* (10 mg/dose/animal) as well as piperine (1.14 mg/dose/animal) could inhibit the solid tumor development in mice induced with DLA cells and increase the life span of mice bearing Ehrlich ascites carcinoma tumor to 37.3 and 58.8%, respectively. Administration of *Piper longum* extract and piperine increased the total WBC count to 142.8 and 138.9%, respectively, in Balb/c mice. The number of plaque forming cells also enhanced significantly by the

administration of the extract (100.3%) and piperine (71.4%) on 5th day after immunization. Bone marrow cellularity and α-esterase positive cells were also increased by the administration of *Piper longum* extract and piperine[50].

கருஞ்சீரகம்

வேறு பெயர்:

அரணம், உபகுஞ்சிகை.

பயன்ப்படும் உறுப்பு - விதை

சுவை - கைப்பு

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

அகட்டுவாய்வகற்றி

சிறுநீர்பெருக்கி

ருதுவுண்டாக்கி

பாற்பெருக்கி

புழுக்கொல்லி

பசித்தீத்தூண்டி

தூக்குணிப்புழுக்கொல்லி

வறட்சியகற்றி

குணம்:

கருஞ்சீ ரகத்தான் கரப்பானொடு புண்ணும்
வருஞ்சிராய்ப் பீநிசமு மாற்றம் - அருந்தினால்
காய்ச்சல் தலைவலியுங் கண்வலியும் போமுலகில்
வாய்ச்ச மருந்தெனவே வை.

மண்டைக் கரப்பான், புண், உட்சூடு, தலைநோய், கண்ணோய் இவைகளும், சிரங்கு, வயிற்றுப்பொருமல், குன்மம், மார்புவலி, இருமல், வாந்தி, ஓக்காளம், வீக்கம், காமாலை ஆகியவைகளும் கருஞ்சீரகத்தால் நீங்கும்.

வழக்கு:

- இதன் பொடியைக் காடியுடன் கலந்து உட்க்கொள்ள குடலிலுள்ள புழுக்கள் வெளிப்படும். இதையே 3-7 நாள் வரையில் காலை1/2, மாலையில் 4 கிராம் வீதம் பைத்திய நாய்க்கடி, இதர நச்சுக்கடி, இவற்றின் நஞ்சு தீரக் கொடுக்கலாம்.
- தேன் விட்டரைத்துப் பிள்ளை பெற்ற பின் வரும் வலிக்குப் பூசலாம்.

- நொச்சிக் குடிநீருடன் இதன் பொடியைக் கூட்டிக் கொடுக்க மேகப் பிடிப்பு, சுரம், விட்டுவிட்டு வருகின்ற சுரம் தணியும்[7].

சேரும் மருந்துகள்:

- ஷயகுலாந்தக மாத்திரை
- மூசாம்பர மெழுகு
- விஷாமிர்த மெழுகு[29]
- மேகசஞ்சீவி நெய்[21]
- அகத்தியர் குழம்பு[30]

NIGELLA SATIVA

It is a small herb, 45 to 65 cm. high; cultivated mostly in Punjab, Himachal Pradesh, Bihar and Assam. It grows in Mullai thinai[30].

SYNONYMS:

Sanskrit: Krishna-jiraka; Upakunchika; Aranyajeeraka. **English:** Small fennel or Black cumin**. Hindi**: Kala – jira; Kulanji. **Bengali:** Mugrela; Kala-jira. **Gujarati:** Kadujeeroo. **Arabic**: Kamune-asvad; Sh-ouniz. **Telugu**: Nallajilakara.**Tamil**: Karunjiragam, Karunshirogam. **Malyalam**: Karunchirakam**. Burma**: Satmung[10].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida
Order	: Ranunculalaes
Family	: Ranunculaceae
Genus	: Nigella L.
Species	: Nigella sativa L[38].

PARTS USED:

Dried fruit and seeds.

CHEMICAL CONSTITUENTS:

Seeds contain a yellowish volatile oil 1.5p.c. and fixed oil 37.5 p.c., essential oil, albumen, sugar, mucilage, organic acids, metarbin, toxic glucoside, melanthin resembling helleborin, ash 5 p.c., moisture and Arabic acid. Volatile oil is the active constituent. It consists of (1) Carvone 45 to 60 p.c., an unsaturated ketone; (2) terpene or d-limestone also called carvene and (3) cymene[10].

ACTIONS:

- Carminative, diuretic, emmenagogue, anodyne, antibacterial, anti-inflammatory, deodorant, appetizing, digestive, antihelmntic, sudorific, febrifuge stimulant, galactogoguue and expectorant.
- Aqueous extract of seeds showed hepatoprotective activity. It also showed hypoglycaemic and antioxidant effect.
- Methanolic extract possesses a potent CNS and analgesic activity[39].

USES:

- Seeds are used as condiment in curries, and with other aromatic substances and bitters. Seeds about half a drachm is given with butter-milk to cure obstinate hiccup.
- It is also useful in indigestion, loss of appetite, fever, diarrhoea, dropsy, puerperal disease, etc. The decoction of the seeds is given to recently-delivered females in combination with few other medicines; it also stimulates uterine contraction.
- Brayed in water its application removes swelling from hands and feet. Seeds have also antibilious property and are administered internally in intermittent fevers and to arrest vomiting[10].

RESEARCH ARTICLES PIBLISHED IN JOURNALS:

1. Recent advances on the anti-cancer properties of Nigella sativa, a widely used food additive Amin F. Majdalawieh, Muneera W. Fayy

Abstract

The use of naturally-occurring agents to regulate tumorigenesis is on the rise. Several herbal extracts, pure plant-derived active constituents, and food additives have been reported to possess potent anticancer properties and cancer-ameliorating effects. The wide-range anti-cancer effects of Nigella sativa, also known as black seed or black cumin, have been extensively studied using different in vitro and in vivo models. Here, we provide a comprehensive, analytical review of the reported anti-cancer properties of N. sativa seed extracts. This review focuses on analyzing experimental findings related to the ability of N. sativa to exert anti-proliferative, pro-apoptotic, anti-oxidant, cytotoxic, anti-mutagenic, antimetastatic, and NK cytotoxic activity enhancing effects against various primary cancer cells and cancer. cell lines. Moreover, we underline the molecular mechanisms of action and the signal transduction pathways implicated in the suppression of tumorigenesis by N. sativa. The major signaling pathway utilized by N. sativa to manifest its anti-cancer activity is the iNOS signaling pathway. This review underscores the recent developments that highlight an effective therapeutic potential of N. sativa to suppress tumor development, reduce tumor incidence, and ameliorate carcinogenesis. In sum,experimental findings reported in the last two decades strongly suggest that N. sativa fractions could serve, alone or in combination with known chemotherapeutic drugs, as effective agents to control tumor initiation, growth, and metastasis, and hence, treatment of a wide range of cancers[51].

2. Anticancer activities of *nigella sativa* (black cumin) Md. Asaduzzaman Khan1, Han-chun Chen, Mousumi Tania1 and Dian-zheng Zhang

Abstract

Nigella sativa has been used as traditional medicine for centuries. The crude oil and thymoquinone (TQ) extracted from its seeds and oil are effective against many diseases like cancer, cardiovascular complications, diabetes, asthma, kidney disease etc. It is effective against cancer in blood system, lung, kidney, liver, prostate, breast, cervix, skin with much safety. The molecular mechanisms behind its anticancer role is still not clearly understood, however, some studies showed that TQ has antioxidant role and

improves body's defense system, induces apoptosis and controls Akt pathway. Although the anti-cancer activity of *N. sativa* components was recognized thousands of years ago but proper scientific research with this important traditional medicine is a history of last 2~3 decades. There are not so many research works done with this important traditional medicine and very few reports exist in the scientific database. In this article, we have summarized the actions of TQ and crude oil of *N. sativa* against different cancers with their molecular mechanisms[52].

3. Antimicrobial and Anticancer Activity of *Nigella sativa oil* –A Review Khalaf M.I and Kholoud S. Rama

Abstract:

Nigella sativa (N. sativa) is an annual herb of the *Ranunculaceae* family, which grows in countries bordering the Mediterranean Sea, Pakistan and India. Acute and chronic toxicity studies have recently confirmed the safety of *N. sativa* oil and its most abundant active component, thymoquinone, particularly when given orally. The extracts of *N.sativa* seeds have been used by patients to suppress coughs, disintegrate renal calculi, retard the carcinogenic process, treat abdominal pain, diarrhea, flatulence and polio, and exert choler tic and uricosuric activities, anti-inflammatory and antioxidant effects. The present work is aimed at summarizing the extremely valuable work done by various investigators on the effects of N. sativa seed, antimicrobial and antiparasitic activity of Nigella sativa oil. We hope this review will help interested researchers to conduct further clinical studies to evaluate the antimicrobial, anticancer activities of *N. sativa*, its active constituents and their derivatives[53].

4. Effects of Thymoquinone in the Expression of Mucin 4 in Pancreatic Cancer Cells: Implications for the Development of Novel Cancer Therapies Maria P. Torres, Moorthy P. Ponnusamy, Subhankar Chakraborty, Lynette M. Smith,Srustidhar Das, Hwyda A. Arafat, and Surinder K. Batra

Abstract

Pancreatic cancer is one of the most lethal cancers in the world, as it continues to be resistant to any therapeutic approaches. The high molecular weight glycoprotein mucin 4 (MUC4) is aberrantly expressed in pancreatic cancer and contributes to the

regulation of differentiation, proliferation, metastasis, and the chemoresistance of pancreatic cancer cells. The absence of its expression in the normal pancreatic ductal cells makes MUC4 a promising target for novel cancer therapeutics. Natural products have been widely investigated as potential candidates in cancer therapies, and thymoquinone (TQ), extracted from the seeds of Nigella sativa, has shown excellent antineoplastic properties in some systems. In the present study, we evaluated the effect of TQ on pancreatic cancer cells and specifically investigated its effect on MUC4 expression.The MUC4- expressing pancreatic cancer cells FG/COLO357 and CD18/HPAF were incubated with TQ, and in vitro functional assays were done. The results obtained indicate that treatment with TQ downregulated MUC4 expression through the proteasomal pathway and induced apoptosis in pancreatic cancer cells by the activation of c-Jun NH2-terminal kinase and p38 mitogen-activated protein kinase pathways. In agreement with previous studies, the decrease in MUC4 expression correlated with an increase in apoptosis, decreased motility, and decreased migration of pancreatic cancer cells. MUC4 transient silencing studies showed that c-Jun NH2-terminal kinase and p38 mitogen-activated protein kinase pathways are activated in pancreatic cancer cells, indicating that the activation of these pathways by TQ is directly related to the MUC4 down regulation induced by the drug. Overall, TQ has potential for the development of novel therapies against pancreatic cancer[54].

5. Cardio-protective and anti-cancer therapeutic potential of Nigella sativa Hammad Shafiq, Asif Ahmad, Tariq Masud, Muhammad Kaleem

Nigella sativa is the miraculous plant having a lot of nutritional and medicinal benefits, and attracts large number of nutrition and pharmacological researchers. *N. sativa* seed composition shows that it is the blessing of nature and it contains and many bioactive compounds like thymoquinone, α-hederin, alkaloids, flavonoids, antioxidants, fatty acids many other compounds that have positive effects on curing of different diseases. Several medicinal properties of *N. sativa* like its anti-cancer, anti-inflammatory, anti-diabetic, antioxidant activities and many others are well acknowledged. However, this article focuses on activity of *N. sativa* against cardiovascular diseases and cancer. For gathering required data the authors went through vast number of articles using search engines like Science direct, ELSEVIER, Pub Med, Willey on Line Library and Google scholar and the findings were classified on the basis of relevance of the topic and were

reviewed in the article. *N. sativa* is rich source of different biologically active compounds and is found effective in controlling number of cardiovascular diseases and various cancers both in vivo and in vitro[55]

6. Evaluation of acute oral toxicity of nigella sativa linn seed methanolic extract in mice Imtiyaz Ahmad1, Jagrati Tripathi, Manik Sharma, Amit Nayak

ABSTRACT

Nigella sativa L. is widely used in traditional medicine to treat various types of ailments and has been described as the future of pharmacology. The evaluation of toxic properties of N. sativa L. is crucial when considering public health protection because exposure to plant extracts can result in undesirable effects on consumers. Modern regulatory systems contain extensive requirements for safety testing of new chemical products before they enter the stream of commerce. Hence, in this study the acute oral toxicity of N. sativa L. seeds extract was investigated in mice. Oral administration of crude extract at the highest dose of 2000 mg/kg resulted in no mortalities or evidence of adverse effects, implying that N. sativa L. seed extract is nontoxic. Throughout 14 days of the treatment no changes in behavioral pattern, clinical sign and body weight of mice in both control and treatment groups. Also macroscopic examination of the organs of the animals treated with extract showed no changes in color. Overall, the results suggest that, the oral administration of N. sativa L. seed methanolic extract did not produce any significant toxic effect in mice. Further, examination revealed normal architecture and no significant adverse effects observed on the kidney, heart, liver, lung and spleen. Hence, the extract can be utilized for pharmaceutical formulations[56]

கத்தூரி மஞ்சள்

வேறு பெயர்:

கஸ்தூரி மஞ்சள்

பயன்ப்படும் உறுப்பு - கிழங்கு

சுவை - கைப்பு

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

உரமாக்கி

வெப்பமுண்டாக்கி

அகட்டுவாய்வகற்றி

குணம்:

புண்ணுங் கரப்பானும் போகாக் கிருமிகளும்
நண்ணுமந் தாக்கினியு நாசமாம்-வண்ணமலர்த்
தொத்தே றளகமின்னே! சுக்கிலமும் புதியுமாங்
கத்தூரி மஞ்சளுக்குக் காண்.

இதனால் பெரும்புண்கள், கரப்பான், நுண்புழுக்கள், அக்கினிமந்தம் இவை போம். ஆண்மையும் பெருகும்.

வழக்கு:

- இதை அரைத்துத் தேய்த்துக் குளிக்க, கரப்பான், பெரும் புண், மந்தம் இவை போம்.
- எண்ணெயிலிட்டுக் காய்ச்சி, உடல்வலி முதலியன நோய்களுக்கும், அடிப்பட்ட நோய்களுக்கும் மேலுக்குத் தேய்க்கலாம்.
- இதன் தூள் 325மி.கி.- 500மி.கி வரை உள்ளுக்குக் கொடுத்துவர வயிற்று நோய், குன்மம் முதலிய நோய்கள் நீங்கும்.
- மணமூட்டிப் பொருள்களோடும், தைலவர்க்கங்களோடும் இதைச் சேர்ப்பது வழக்கம்[7].

சேரும் மருந்துகள்:

- மேகசிந்தாமணி மெழுகு[29]
- தூதுவளை நெய்[8]
- சிந்தாமணி எண்ணெய்[10]
- அட்ட சூரணம்[8]
- சகதேவி தைலம்
- பிருங்காமலக தைலம்
- அரக்குச் சந்தனாதி தைலம்
- விரணநாச தைலம்[29]

CURCUMA AROMATICA

Found wild all over in Bengal and largely cultivated in gardens.

SYNONYMS:

Sanskrit: Vanaharidra. **English:** Yellow Zedoary, CochinTurmeric. Hindi: Jangli haldi**. Bengali:** Ban-halad. **Bombay:** Ran-hald; Ambe-haldi; **Gujarati:** Kapur-kachali. **Telugu:** Adavipasupu, Kasturi-pasupa. **Tamil:** Kasthuri-manjal. **Malayalam:** Kattumanjal. **Arabic:** Judwar. **Burma:** Kiyasanoin[10].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Superdivision	: Embryophyta
Division	: Tracheophyta
Class	: Magnoliopsida
Order	: Zingiberales
Family	: Zingiberaceae
Genus	: Curcuma L.
Species	: Curcuma aromatica Salib[38].

PARTS USED:

Rhizome or Tuber.

CHEMICAL CONTITUENTS:

A Volatile essential oil, resin, starch, mucilage, sugar, gum, albuminoids and curcumin- a yellow colouring matter.

ACTION:

Tonic, stimulant and carminative[10].

USES:

- The tubers are applied externally in combination with astringents, bitters and aromatics, to bruises and sprains. They are also used in skin eruption and infection and to improve the complexion.
- Rhizome paste/ powder used externally in leucoderma, scabies and small pox, considered useful in blood diseases and intestinal worms; juice given orally as a strong remedy against rheumatism and also administered for smooth delivery[39].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. REVIEW ARTICLE Curcumin: A Potential Bioactive Agent Deepak Prashar, Khokra SL, Rahul Purohit, Shalini Sharma

Abstract

Curcumin (diferuloylmethane), the main yellow bioactive component of turmeric has shown a wide spectrum of biological actions. Clinically, curcumin has already been used to reduce post-operative inflammation. Safety evaluation studies indicate that curcumin is well tolerated at a very high dose without any toxic effects. Moreover, curcumin have the potential for the development of modern medicine for the treatment of various diseases. This review paper serves to highlight the extensive work done to establish the biological and pharmacological actions, safety and stability aspects along with the structure and possible modifications in curcumin to enhance its bio-effectiveness[57].

2. Pharmacological activities of wild turmeric (*Curcuma aromatica* Salisb): a review

Sikha A, Harini A, Hegde Prakash L

Abstract

Wild Turmeric (*Curcuma aromatica* Salisb.) is extensively used as an aromatic medicinal cosmetic in India. The plant has been in traditional use and in Ayurvedic literature it is mentioned as a remedy for various diseases related to skin, cardiovascular

and respiratory system. For the last few decades, research works have been done to establish the pharmacological potential of wild Turmeric and its extracts. Some of them include anti-inflammatory, wound healing, anti-melanogenic, antioxidant and free radical scavenging activity, anti-tumor, anti-cancer, anti-repellent, antitussive, anti-platelet activity and antinephrotoxic activity. This review gives an update mainly on the pharmacological activities of *Curcuma aromatic* Salisb. and its extracts with plausible medicinal applications[58].

3. Antibacterial Activity of Rhizome of Curcuma aromatica and Partial Purification of Active Compounds S. REVATHI AND N. S. MALATHY Departments of Plant Biology and Plant Biotechnology, PSGR. Krishnammal College for Women, Coimbatore-641004, India Revathi and Malathy: Antibacterial Activity *Curcuma aromatica*

The hexane extract of Curcuma aromatica, a plant belonging to the family Zingiberaceae was tested on 10 bacterial strains (clinical isolates and standard strains). Agar diffusion method was adopted for determining the antibacterial activity of the extract. The hexane extract was found to be active against all Gram-positive strains tested, but inactive against Gram-negative strains. The minimum inhibitory concentration and minimum bactericidal concentration were determined and found to be 539 μg/ml. The phytochemical analysis of hexane extract by gas chromatography mass spectrometry revealed the presence of 13 compounds. The crude hexane extract was partially purified by thin layer chromatography. The zone showing good antibacterial activity was analysed further by gas chromatography mass spectrometry, UV/Vis spectrophotometry and Fourier transform infrared spectroscopy, which indicated the probable presence of germacrone[59].

4. Antioxidant and antidiabetic activity of *curcuma aromatic* Ammayappan Rajam Srividya, Palanisamy Dhanabal, Parthkumar Bavadia, Vaithiyalingam Jagannathan Vishnuvarthan, Muthureddy Natarajan Sathish Kumar JSS College of Pharmacy, Rockland's, Ootacamund, Tamilnadu, India

Abstract

The objective of this paper is to find out the antidiabetic activity of *Curcuma aromatica.* In this research paper we dealt with antioxidant activities by DPPH method, ABTS method, Lipid peroxidation assay and scavenging ability of the extract for the

hydrogen peroxide radical, Glucose uptake by rat hemi diaphragm method. Antidiabetic activity using healthy adult Wister rats was also carried out. Toluene extract of *Curcuma aromatica* showed the potent scavenging activity by DPPH method with the IC 50 value of 50.62±0.998 µg/ml, by lipid per oxidation method with the IC 50 value of 75±0.87 µg/ml, hydrogen peroxide radical scavenging activity with the IC 50 value 43.75±1.24 µg/ml, and ABTS radical scavenging method with the IC 50 value 0.038±1.54 µg/ml. After the treatment with the toluene extract of *Curcuma aromatica*, serum glucose level was found to be decreased from 278.53 to 116.5 mg/dl, total protein level increased from 3.09 to 5.78 mg/dl. There was a decrease in total cholesterol level from 292.33 to 134.50 mg/dl, decrease in serum triglyceride level from 85.66 to 64.16mg/dl when compared to diabetic control group. Toluene extract of *Curcuma aromatica* exhibited significant antioxidant and antidiabetic activities in both *in vitro* and *in vivo* models. So, it can be used as alternative herbal medicine in the treatment of diabetes and diabetic induced complication[60].

5. **Turmeric: A spice with multifunctional medicinal properties** Hamid Nasri1, Najmeh Sahinfard, Mortaza Rafieian3, Samira Rafieian, Maryam Shirzad, Mahmoud Rafieian-kopaei2

Abstract

C*urcuma longa* (Turmeric), belonging to Zingiberaceae family is one of the most useful herbal medicinal plants. Extensive researches have proven that most of the turmeric activities of the turmeric are due to curcumin. It has various useful properties with antioxidant activities and is useful in conditions such as inflammation, ulcer and cancer. It also has antifungal, antimicrobial renal and hepatoprotective activities. Therefore, it has the potential against various cancer, diabetes, allergies, arthritis, Alzheimer's disease and other chronic and hard curable diseases. The purpose of this review was to provide a brief summary of the new and current knowledge of the effects of curcumin. The recently published paper in international cites such as PubMed/Medline, Science Citation Index and Google Scholar about turmeric were searched. Recent studies have authenticated the use of turmeric for various diseases especially oxidative stress induced ones such as cancer, diabetes mellitus and inflammatory disorders. It also is used as hepatoprotective, nephroprotective, anticoagulant and anti-HIV to combat AIDS. Curcumin, as a spice, exhibits great

promise as a therapeutic agent. It has very low toxicity, too. As the global scenario is now changing towards the use of non-toxic plant products having traditional medicinal use, development of modern drugs from turmeric should be emphasized for the control of various diseases. Further evaluation needs to be carried out on turmeric in order to explore the concealed areas and their practical clinical applications, which can be used for the welfare of mankind[61].

கொடிவேலி

வேறு பெயர்:

அமிஞ்சில், அதிகாரி, அதிபதுங்கி, அழல், உதாசனன், எரி, எழுநா, ஒலி, கருநாகம், கனலி, காரிமை, கொடுவேலி, கானிலிந்திரன், கானிலம், கொடிச்சி, சித்திரமூலி, சித்திரமூலம், சித்திரம், ஞெகிழி, தழல், திக்கு, திசைநா, வஞ்சதாரம், வன்னி, அக்னி, அதிசனசி, உதகவன், சதாவேதா, சித்திரகம், தபனன், திகனா, வசகம், வனமா, வன்னிபரியம், சித்ரகம், கொடிவன்னி, வலிவன்னி, திவிபிநாமம்7.

கொடிவேலியில் மூன்று சாதிகளுண்டு.

1. கருங்கொடிவேலி
2. செங்கொடிவேலி
3. வெண்கொடிவேலி[7]

செய்கை:

உற்சாகாரி

முறைவியாதிரோதி

சுவேதகாரி

துவக்ஸ்போடகாரி

ருதுவர்த்தனகாரி

ஷோணகாரி

திரவகாரி

குணம்:

கட்டிவிர ணங்கிரந்தி கால்கள் அரையாப்புக்
கட்டிச்சூ லைவீக்கங் காழ்மூலம் - முட்டிரத்தக்
கட்டுநீ ரேற்றங் கனத்த பெருவயிறும்
அட்டுங் கொடிவேலி யாம்.

இதனால், கட்டி, புண், கழலை, வளிநோய், அரையாப்புக்கட்டி, குத்தல், சோபை, மூலரோகம், உதிரக்கட்டு, நீரேற்றம், பெருவயிறு இவைபோம்[62].

சேரும் மருந்துகள்:

- வில்வாதி லேகியம்
- அசுவகெந்தி லேகியம்
- திரிசூத மெழுகு
- கந்தக இரசாயணம்[29]
- மகா பூரண சந்திரோதயம்[63]

நஞ்சுக் குறிகுணம்:

சித்திர மூல வேர்ப்பட்டையைச் சிதைத்து உடம்புத்தோலின் மீது பூசினால் தோல் சிவந்து எரிவதோடு புண்ணுமுண்டாகும். சிலர் இதைத் தவறான முறையில் பயன்ப்படுத்துவதுமுண்டு. அதனால் உடல்நிலை கெட்டு சாவு ஏற்படுத்துவதுமுண்டு. இதை அளவுக்கு மீறி உள்ளுக்குல் கொடுத்தால் வயிற்றில் அழர்ச்சியையும் எரிச்சலையுமுண்டாக்குவதோடு சாவையும் விளைவிக்கும்.

நஞ்சுமுறிவு:

- நல்லெண்ணெய்யில் உளுந்துவடை சுட்டு உண்ணலாம்
- பசுநெய்யைக் குடிக்க வேண்டும்.
- பேய்ப்பீர்க்கு, கோரைக்கிழங்கு ஆகிய இரண்டையும் சேர்த்துக் கியாழமிட்டுக் கொடுத்தாலும் சித்திரமூல வேர்நஞ்சு நீங்கும்[8].

PLUMBAGO INDICA

This garden plant is growing wild in Bengal, Uthra Pradesh, Southern India and Ceylon[33].

SYNONYMS:

Sanskrit: Chitraka; Agni-shikha. English: Ceylon Leadwort; White Leadwort. **Germany:** Ceylonische Bleiwurz. **Hindi:** Chitra; Chita; Chiti. **Punjabi:** chitrak. **Bengali:** Chita; Chtruk. **Gujarati:** Chitaro. **Telugu**: Agnimatha; Chitra-mulam. **Tamil:** Chtiira; Chitiramulam. **Malayalam:** Vellakotuveri.

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Superdivision	: Embryophyta
Division	: Tracheophyta
Class	: Magnoliopsida
Order	: Caryophyllales
Family	: Plumbaginaceae
Genus	: Plumbago L.
Species	: Plumbago zeylanica L.

PARTS USED: Root

CHEMICAL CONSTITUENTS:

3-Rhamnosides of pelargonidin, Cyanidin, delphinidin and Kaempferol (flowers); arachidyl alcohol, 2- methyl-5-hydroxy-1,4-napthquinone (plumbagin;also in the root),

β-sitosterol and its glucoside(root bark); α-naphthoquinone and α-naphthylamine isolated from the root.

ACTION:

Anticancer, antibacterial, antifungal, Stimulant, abortifacient, alterative, appetizer, gastric stimulant, sialagogue, vesicant, antimutagenic and insecticidal activities.

USES:

- Root is used in the treatment of rheumatism, paralytic affections, colic, inflammations, cough, bronchitis, chronic and intermittent fever, leprosy, leucoderma, ringworm, scabies anemia and syphilis.
- Plumbagin act as a powerful irritant and has antiseptic properties. Plumbagin in small doses has a stimulant action on central nervous system, on plain muscles

and on secretion of sweat, urine and bile. With large doses plumbagin causes paralysis leading to death[39].

TOXIC SYMPTOMS:

Applied externally, roots produce irritation and blisters. Taken internally, there is burning pain from mouth to stomach, vomiting, thirst, diarrhoea, collapse and death.

TREATMENT:

- Stomach wash
- Demulcents and
- Symptomatic treatment[14].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Plumbagin, a medicinal plant (Plumbago zeylanica)-derived 1,4-naphthoquinone, inhibits growth and metastasis of human prostate cancer PC-3M-luciferase cells in an orthotopic xenografts mouse model Bilal Bin Hafeeza,*, Weixiong Zhongb, Joseph W. Fischera, Ala Mustafaa,Xudong Shic, Louise Meskea, Hao Hongd, Weibo Caid, Thomas Havighurste,KyungMann Kime, Ajit K. Vermaa

We present here first time that Plumbagin (PL), a medicinal plant-derived 1,4-naphthoquinone, inhibits the growth and metastasis of human prostate cancer (PCa) cells in an orthotopic xenografts mouse model. In this study, human PCa PC-3M-luciferase cells (2 _ 106) were injected into the prostate of athymic nude mice. Three days post cell implantation, mice were treated with PL (2 mg/kg body wt. i.p. five days in a week) for 8 weeks. Growth and metastasis of PC-3M-luciferase cells was examined weekly by bioluminescence imaging of live mice. PL-treatment significantly (p ¼ 0.0008) inhibited the growth of orthotopic xenografts tumors. Results demonstrated a significant inhibition of metastasis into liver (p ¼ 0.037), but inhibition of metastasis into the lungs (p ¼ 0.60) and lymph nodes (p ¼ 0.27) was not observed to be significant. These results were further confirmed by histopathology of these organs. Results of histopathology demonstrated a significant inhibition of metastasis into lymph nodes (p ¼ 0.034) and lungs (p ¼ 0.028), and a trend to significance in liver (p ¼ 0.075). None of the mice in the PL-treatment group showed PCa metastasis into the liver, but these mice had small

metastasis foci into the lymph nodes and lungs. However, control mice had large metastatic foci into the lymph nodes, lungs, and liver. PL-caused inhibition of the growth and metastasis of PC-3M cells accompanies inhibition of the expression of: 1) PKCε, pStat3Tyr705, and pStat3Ser727, 2) Stat3

Abbreviations: PL, plumbagin; PCa, prostate cancer; PKCε, protein kinase C epsilon; Stat3, signal transducers and activators of transcription [64].

2. **Plumbagin from *Plumbago Zeylanica* L Induces Apoptosis in Human Non-small Cell Lung Cancer Cell Lines through NF-kB Inactivation** Tong-Peng Xu, Hua Shen, Ling-Xiang Liu, Yong-Qian Shu*

Abstract

Objective: To detect effects of plumbagin on proliferation and apoptosis in non-small cell lung cancer cell lines, and investigate the underlying mechanisms.

Materials and Methods:

Human non-small cell lung cancer cell lines A549, H292 and H460 were treated with various concentrations of plumbagin. Cell proliferation rates was determined using both cell counting kit-8 (CCK-8) and clonogenic assays. Apoptosis was detected by annexin V/propidium iodide double-labeled flow cytometry and TUNEL assay. The levels of reactive oxygen species (ROS) were detected by flow cytometry. Activity of NF-kB was examined by electrophoretic mobility shift assay (EMSA) and luciferase reporter assay. Western blotting was used to assess the expression of both NF-kB regulated apoptotic-related gene and activation of p65 and IkBk.

Results:

Plumbagin dose-dependently inhibited proliferation of the lung cancer cells. The IC50 values of plumbagin in A549, H292, and H460 cells were 10.3 μmol/L, 7.3 μmol/L, and 6.1 μmol/L for 12 hours, respectively. The compound concentration-dependently induced apoptosis of the three cell lines. Treatment with plumbagin increased the intracellular level of ROS, and inhibited the activation of NK-kB. In addition to inhibition of NF-kB/p65 nuclear translocation, the compound also suppressed the degradation of IkBk. ROS scavenger NAC highly reversed the effect of plumbagin on apoptosis and inactivation of NK-kB in H460 cell line. Treatment with plumbagin also

increased the activity of caspase-9 and caspase-3, downregulated the expression of Bcl-2, upregulated the expression of Bax, Bak, and CytC.

Conclusions:

Plumbagin inhibits cell growth and induces apoptosis in human lung cancer cells through an NF-kB-regulated mitochondrial-mediated pathway, involving activation of ROS[65].

3. Plumbagin induces ROS-mediated apoptosis in human promyelocytic leukemia cells in vivo Kai-Hong Xu[a], Dao-Pei Lu[a, b, ,]

Abstract

Plumbagin, a naphtoquinone from the roots of Plumbago zeylanica is known to possess anticancer and anti-bacterial activity. Based on the former finding of our group in vitro demonstrating its effectiveness in human promyelocytic leukemia cells, NB4, in this study we further revealed the mitochondrial pathway involved in plumbagin-induced apoptosis. We also found that the generation of ROS was a critical mediator in plumbagin-induced apoptosis, which would be abrogated completely by antioxidant, NAC. The anticancer effect of plumbagin was investigated in vivo using NB4 tumor xenografts in NOD/SCID mice. The incidence of formation, growth characteristics, body weight and volume of tumors were observed. The histopathologic examination of tumors and organs were made. The results showed that intraperitoneal injection of plumbagin (2 mg/kg body weight) daily for 3 weeks resulted to a 64.49% reduction of tumor volume compared with the control. Furthermore, there was no overt manifestation of toxicity such as weight loss, tissue damage and behavior change which appeared in Doxorubicin-treated mice (1 mg/kg thrice a week). These results indicate that plumbagin has potential as a novel therapeutic agent for myeloid leukemia[66].

4. Plumbagin, Isolated from *Plumbago zeylanica*, Induces Cell Death through Apoptosis in Human Pancreatic Cancer Cells

Abstract

Background and Aims*:*

Pancreatic cancer is one of the most resistant malignancies. Several studies have indicated that plumbagin isolated from ***Plumbago zeylanica*** possesses anticancer activity. However, its antitumor effects against pancreatic cancer have not been explored.

Methods:

We investigated the effect of piumbagin on the growth of human pancreatic carcinoma cells and its possible underlying mechanisms. ***Results:*** Plumbagin inhibited the growth of Panc-1 and Bxpc-3 cells in a dose-dependent and time-dependent manner. Liu's staining and transmission electron microscopy demonstrated morphological changes resembling apoptosis in Panc-1 ceils treated with piumbagin. The degree of apoptosis was assessed by measuring the proportions of sub-G_1, annexin V+/propidium iodide-, and terminal-deoxynucleotidyl-transferase-mediated-nick-end labeling (TUNEL)+ cells, and a significant increment in apoptotic cells was observed. Exposure to piumbagin caused the up regulation of Bax, a rapid decline in mitochondrial transmembrane potential, apoptosis-inducing factor over expression in cytosol, and the cleavage of procaspase-9 and poly ADP-ribose polymerase. Activation of caspase-3, but not caspase-8, was evidenced by fluorometric substrate assay. Pretreatment with caspase inhibitors did not block plumbagin-induced apoptosis. Alternatively, it is possible that piumbagin down-regulated phosphoinositide3-kinase activity through a negative feedback mechanism. In an orthotopic pancreatic tumor model, piumbagin markedly inhibited the growth of Panc-1 xenografts without any significant effect on leukocyte counts or body weight.

Conclusion:

Piumbagin may induce apoptosis in human pancreatic cancer cells primarily through the mitochondria-related pathway followed by both caspase-dependent and caspase-independent cascades. It indicates that piumbagin can be potentially developed as a novel therapeutic agent against pancreatic cancer[67].

கடுக்காய்

வேறு பெயர்:

அக்கோடம், அங்கணம் ,அந்தன், அபரணம், அபையன், அமரிதம், அமலை, அமுதம், அம்மை, அம்ருதா, அரபி, அரிதகி, அலியன்,அவ்வியதா, இரேசகி, ஏமவதி ஐயவி, ஹைமவதி, கடு, காயஸ்த்தா, சியிருதம்,சிரயஹி, சிரோட்டம், சிவா, சேதகி, சேதநிகா, சேயா, திவ்யா, தேவி, நந்திரி, நெச்சி, பத்தியம், பாரியம், பிஷக்வரா, பூதனா, பூதன், ப்ரபத்யா, ப்ராணதா, மேகம், வயதரம், வயஸ்த்தா, வரிக்காய், வனதுர்க்கி, விஜயவேதன், ரோகிணி, ஜிவநிகா, ஜீவந்தி, ஜீவப்பிரியா, ஜீவ்யா, ஜெயா.

பயன்ப்படும் உறுப்பு - பிஞ்சு, பழம்

சுவை - முக்கிய சுவை - துவர்ப்பு, அத்துடன் சிறிது-இனிப்பு - புளிப்பு கார்ப்பு, கைப்பு பெற்றிருக்கும்.

கொட்டை - துவர்ப்பு, **பருப்பு** - இனிப்பு, **நரம்பு** - புளிப்பு, **காம்பு** - கைப்பு, **தோல்** - கார்ப்பு, **தன்மை**- வெப்பம், **பிரிவு** - இனிப்பு[7].

செய்கை:

மலகாரி

சங்கோசனகாரி

தாதுஷீணரோதி

ரக்தஸ்தம்பனகாரி

உதரவாதஹரகாரி

குணம்:

தாடை கழுத்தக்கி தாலு குறியிவிடப்

பீடை சிலிபுதமுற் பேதிமுடம் - ஆடையெட்டாத்

தூலமிடி புண்வாத சோணிகா மாலையிரண்

டாலமிடி போம்வரிக்கா யால்.

கடுக்காயினால் கன்னம், களம், கண், ஆண்குறி இவ்விடத்து நோய்கள் பாதவன்மீகம், அதிசாரம், பங்குவாதம், அதிதூலம், இடிப்புண், வாதசோணிதவாதம், காமிலம், தாவரசங்கம விஷங்கள் இவைபோம்[62].

வழக்கு:

- ஒவ்வொரு நாளும் காலைதோறும் கடுக்காயை ஓராண்டு சாப்பிட்டு வர, நரைதிரை மாறும்.
- கடுக்காயைத் தட்டித் துணியில் முடிந்து, ஆமணக்கெண்ணெயிலிட்டு சூரிய புடம் வைத்து, கண்ணில் பிழிய கண் அமரம் நீங்கும்.
- கடுக்காயும், காசுக்கட்டியும் சமபாகமெடுத்து அரைத்து நாக்கு விரணத்துக்குத் தடவ, நன்மை தரும்
- கடுக்காயின் நுண்ணிய பொடியையேனும், கஷாயத்தையேனும் மூலத்தின் மீது அல்லது கழுவ இரத்தம் நிற்கும்.
- கடுக்காய்ப் பொடியை நசியமிட, இரத்தபீனசம் நீங்கும்[7].

சேரும் மருந்துகள்:

- சிங்கித் தைலம்
- மாதுளைத் தைலம்[29]
- இரண பைரவி செந்தூரம்
- கண் அமிர்தப் பொடி[67]
- சுராங்குசம்[63]

TERMINALIA CHEBULA

Native of Asia, the plant grows in china, Nepal, Sri Lanka, Myanmar, Bangladesh, Egypt, Iran and Turkey. In India occasional in deciduous forest of Himachal Pradesh, Karnataka, Kerala, Tamilnadu, Andhra Pradesh, Uttar Pradesh and West Bengal[39].

SYNONYMS:

Sanskrit: Abhaya, Amogha, Amruta, Avyatha, Balya, Bhishagvara, Bhishakpriya, chetaki, chetamaki, Devi, Divya, Girija, Haimavathi, Haritaki, Himaja, Jaya, Jivanika, Jivanti, Jivapriya, Jivya, Karkatasringi, Kayastha, Nandini Pachani, Panjarasa, Pathya, Pramatha, Pranada, Prapathya, Putana, Rasayanaphala, Reshaki, Rohini, Rudrapriya, Shaka, Shakrasrishtu, Shiva, Shreyasi, Sudha, Sudhodbhava, Triphala, Vanatikta, Vayastha, Vijaya**. Tamil:** Amagola, Arabi, Aridadi, Attan, Kadu, kadukkay, Kagodagasingi, Nechi, Pattiyam, Piradamani, Seya, Sidegi, Singi, Sirottam,

Sittilai, Siva, Sivandi, Taduvairi, Tuvarchigai, Urogini Vayadaram. **Telugu:** Haritaki, Karaka, Karkkaya, Nallakaraka, Resaki, Sringitiga. **Bengali:** Haritaki, Berar, **Gujarati:** Hirdo. **Hindi:** Har, Harara, Harra. **Punjabi:** Halela, Har, Harrar, Hurh[10].

TAXNOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Superdivision	: Embryophyta
Division	: Tracheophyta
Class	: Magnoliopsida
Order	: Myrtales
Family	: Combretaceae
Genus	: Terminalia
Species	: Terminalia chebula[38]

PARTS USED:

Dried fruits; immature fruits: mature fruits myrobalans and galls; mostly the outer skin and fruits

CHEMICAL CONSTITUENTS:

Major : Tannins, anthraquinones, chebulinic acid, chebulagic acid, chebulic acid, ellagic acid and gallic acid.

Minor: Fruit also possesses corilegin, β-D-glucogallin, glucose and sorbitol. Polyphenolic compounds, triterpene glycosides, terchebulin, punicalagin, terflavin A, flavonoids, reducing sugars and starch are other constituents of the fruit. Terpenene glycosides, arjungenin and arjunglucoside-I have been isolated from the fruit. It is also reported to have 18 amino acid[43].

ACTIONS:

- Laxative, hypolipidaemic and antioxidant agent. Drug has also been reported to have hepatoprotective, adaptogenic and cardiac activities. Antiviral and antibacterial actions of the fruit has been validated scientifically.

- Stomachic, tonic, carminative expectorant, anthelmintic, antidysenteric, alterative.

USES:

- It is useful in asthma, sore throat, thirst, vomiting, hiccough, eye diseases, diseases of the heart and the bladder, strangury, vesicular calculi, urinary discharges, ascites, biliousness, inflammations, tumours, bleeding piles, typhoid fever, leucoderma, dyspnoea, itching, pain, constipation, anemia, gout, elephantiasis delirium.
- The unripe fruit is useful in astringent and aperients, useful in dysentery and diarrhoea – The ripe fruit is purgative, tonic, carminative, enriches the blood; good in ophthalmic, diseases of the spleen , piles cold in the head; strengthens the brain, the eye, the gums; used in paralysis[10].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Evaluation of anticancer potential of *Terminalia chebula* Fruits against Ehrlich Ascites Carcinoma induced cancer in mice *Rohini Abuja, Née raj Garhwal, Amok Mukerjee*

Abstract

This study was designed to determine the in vivo and in vitro anticancer potential of the ethanolic extract of *Terminalia chebula* (ETC) fruits against Ehrlich Ascites Carcinoma (EAC) induced cancer in swiss albino mice. The anticancer activity was assessed using in vitro cytotoxicity, mean survival time, tumor volume and hematological studies. The reliable criteria for evaluating the potential of any anticancer agent is the prolongation of lifespan of the animal and decrease in WBC count of blood.The high dose of ETC (200 mg/kg, orally) significantly reduced the tumor growth which was demonstrated by increased lifespan of the mice and restoration of hematological parameters. ETC was also found to be cytotoxic in the in vitro parameter which shows that ETC possesses significant anticancer potential[68].

2. Chebulagic acid from Terminalia chebula causes G1 arrest, inhibits NFκB and induces apoptosis in retinoblastoma cells Naresh Kumar†, Gangappa D†, Geetika Gupta and Roy Karnati*

Abstract

Background:

Plants are the valuable source of natural products with important medicinal properties. Most of the approved anti cancer drugs have a natural product origin or are natural products. Retinoblastoma is the most common ocular cancer of children. Although chemotherapy is the preferred mode of therapy, a successful treatment for retinoblastoma requires enucleation. Chebulagic acid (CA) from Terminalia chebula was shown to have anti-proliferative properties in the studies on cancerous cell lines. Due to anti cancer properties of CA and due to limitation in treatment options for retinoblastoma, the present study is undertaken to understand the role of CA on the proliferation of retinoblastoma cells.

Methods:

Anti proliferative potential of CA was determined by MTT assay. The expression levels of various cell death mediators in retinoblastoma cells with CA treatment were assessed by Western blotting. Flowcytometer analysis was used to estimate the mitochondrial membrane potential (MMP) and to determine the percentage of cells undergoing apoptosis.

Results:

The present study showed CA inhibited the proliferation of retinoblastoma cells in a dose dependent manner. CA modulated MMP, induced release of Cytochrome c, activated caspase 3 and shifted the ratio of BAX and Bcl2 towards cell death. G1 arrest, noticed in CA treated cells, is mediated by the increase in the expression of CDK inhibitor p27. CA treatment also decreased the levels of NFκB in the nucleus. This decrease is mediated by suppression in degradation of IκBα.

Conclusion:

CA has shown significant anti proliferative potential on retinoblastoma cells. Our findings clearly demonstrate that CA induces G1 arrest, inhibits NFκB and induces apoptosis of retinoblastoma cells[69].

3. Aqueous Extract of *Terminalia chebula* Induces Apoptosis in Lung Cancer Cells Via a Mechanism Involving Mitochondria-mediated Pathways Meiling Wang[2], Limin Yang[1], Musi Ji[3], Pengwei Zhao[1], Peng Sun[1], Ruixia Bai[4], Yu

Abstract

The current study was designed to evaluate the aqueous extract of Terminalia chebula activity, and the main pathway was detected on lung cancer by extracts of T. chebula. Aqueous extract of T. chebula was separated using a zeolite, and five fractions of T. chebula extract were obtained and analyzed by ultraviolet (UV) and infrared (IR) spectroscopy. Antiproliferative activity was evaluated by 3-(4,5-dimethylthiazol-2-yl)-2,5 diphenyltetrazolium bromide (MTT) methods against human lung cancer (A549) and mouse lung cancer cell line LLC. T. chebula acts by regulating the Bcl-2 family protein-mediated mitochondrial pathway detected by western blot. Fraction 4 of the T. chebula extract showed much function and was thus studied further. Fraction 4 increased the activation of caspase-3, induced PARP cleavage, and promoted cytochrome c release into the cytoplasm. These data suggest that T. chebula acts by regulating the Bcl-2 family protein-mediated mitochondrial pathway and provide evidence that T. chebula deserves further investigation as a natural agent for treating and preventing cancer[70]

4. Enhanced Antibacterial, Anticancer Activity from Terminalia chebula Medicinal Plant Rapid Extract by Phytosynthesis of Silver Nanoparticles Core-shell Structures Bupesh G1,2*, Manikandan E1,5,6*, Thanigaiarul K2, Magesh S1,2, Senthilkumar V2, Tamilarasan S4, Pandian K3, Gurib-Fakim A5,6 and Maaza M5,

Abstract

Background:

Colon cancer is one of the major cancer causing morbidity and mortality around the world. *Terminalia chebula* is a rich medicinal value herb, which is widely employed for many diseases. *T. chebula* was used for the first time to synthesize rapidly silver nanoparticles. In this study, the methanolic extract of *T. chebula* reduced the silver nanoparticles biologically and ecofriendly. The biosynthesized silver nanoparticles were explored against colon cancer cells and multi drug resistant (MDR) broad spectrum microorganism.

Results:

Rapid synthesis of silver nanoparticles was biologically done by methanolic extract *T. chebula*. It was further characterized by FTIR, XRD, SEM, TEM and particle size analyzer. The average nanoparticle particles size around 70 nm and spherical shaped core-shell were observed. Silver NPs were potentially examined against colon cancer and MDR. The antibacterial activity against MDR *E.coli* revealed significant activity to dose dependant manner. The anticancer activity of Ag NPs was attained at 10 µg concentration.

Conclusions:

The present studies propose that the silver nanoparticles from *T. chebula* methanolic extract exhibit significant antibacterial and anticancer activity. This study insights the *T. chebula* synthesized silver NP's could be an effective applicability drug candidate for colon cancer and applied externally for the MDR bacteria wound infections[71].

5. Evaluation of *in vitro* anticancer activity of *Terminalia chebula* and Identification of Phytocompounds by GC MS analysis Deena Priscilla H.1 and Jasmine R.*2

Abstract

The present study was aimed to evaluate the potential of the ethanolic extract of Terminalia chebula in mitigating breast cancer, which is crippling several women around the world. We have identified the phytochemicals and confirmed by GC-MS studies. Further investigations were carried out to determine the anticancer activity of the extract invitro by MTT assay and antioxidant activity by Reducing Power assay. The results obtained were found to be effective in authenticating the pharmacological nature of T. chebula. In this effort, we have surfaced with a promising potential therapeutic agent as a part of our research work. Our observations are suggestive of the fact that this extract could ably serve as a drug candidate for further research, being a harbinger of hope to cancer patients[72].

குரோசாணி ஒமம்

வேறு பெயர்:

திப்பியம், காரஸவை, காரபி, கார்சவை

பயன்படும் உறுப்பு - விதை

சுவை - கார்ப்பு, சிறுகார்ப்பு

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

உறக்கமுண்டாக்கி

தாதுவெப்பகற்றி

துயரடக்கி

இசிவகற்றி

சிறுநீர் குறை படப்பெருக்கி

குணம்:

வெகுமூத் திரம்வாதம் வீரியட் டம்புண்

உகுபேதி யுட்கடுப்பி னோடே - மிகுகரப்பான்

தீராக் கபமிவைபோம் செய்யகு ரோசானியென்றால்

வாரா மயக்கமுறு மால்

இதனால், மிகுதியாகச் சிறுநீர் கழித்தல், புண், கழிச்சல், கடுப்பு, கரப்பான், ஐயநோய்கள், வன்மைக் குறைவு இவைகளும் போகும்.

வழக்கு:

- இச்செடியின் இலை, பூ, வித்து இவைகளிலிருந்து எடுக்கும் சாற்றை உலர்த்தியது Extract- Hyoscyamus எனப்படும்.
- அளவு: 65 மி.கி-320 மி.கி. இதை நினைவு தடுமாற்றம், தூக்கமின்மை, சூதக வலியில் காணும் தமரகத்தடிப்பு இவைகட்குக் கொடுக்கலாம்.
- இதில் தாது வெப்பகற்றுஞ் செய்கை அதிகமாய் அமைந்திருப்பதனால் ஜன்மேந்திரியங்கள், குடல், நுரையீரல்(சுவாசகாசம்) இவ்விடங்களில் காண்கின்ற எரிச்சலை மிக நன்றாகச் சாந்தப்படுத்தும்[7].

சேரும் மருந்துகள்:

- அசுவகெந்திச் சூரணம்[29]
- கந்தக இரசாயணம்
- திப்பிலி இரசாயணம்
- சரபுங்க வில்வாதி இளகம்
- கபாட மாத்திரை
- நந்தி மெழுகு
- வெண்பூசணி நெய்[30]

HYOCYAMUS NIGER

Found in temperature Western Himalayas at an altitude between 2700 m in to 3700 m extending from Kashmir to Garhwal. Cultivated also in certain parts of western Himalayas[33]

SYNONYMS:

Arabic: Bazrulbanj, Sikram**. Bengali:** Khorasaniajowan. **Bombay**: Khorasaniowa. **Brazil**: Meimendro negro. **English**: Belene, Brosewort, Chenile, Black Henbane, Henbane, Henbell, Henkam, Hogasbean, Loaves–of-bread, Sickly-smelling Henbane, Stinking Roger, Symphonica. **Gujarati**: Khorasniajmo, Khorasaniajvan. **Hindi**: Khurasaniajvayan, Khurasanijamani, Khurosaniyamani. **Punjabi:** Bangdiweana, Bazrbang, Damtur, Dandura, Datura, Dentura, Sura. **Sanskrit:** Dipya, Kuberakhya, Madaka, Madakarini, Mani, Parasikaya, Shyama, Tivra, Turushka, Yavani. **Tamil:** Kurasaniyamam. **Telugu:** Kurashanivamam, Kurinjivamam[31].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Superdivision	: Embryophyta
Division	: Tracheophyta
Class	: Magnoliopsida
Order	: Solanales
Family	: Solanaceae
Genus	: Hyoscyamus L[38].

Species : Hyocyamus niger L[38].

PARTS USED: Leaves and Seeds.

CHEMICAL CONSTITUENTS:

Apoatropine, Cuscohygrine, daturamine, hyoscine(scopolamine), hyoscyamine, (-)-6β-hydroxyhyoscyamine and Tropine (also in leaves, root); alkanes, linoleic, myristic, oleic, palmitic and stearic acids; phytin(seeds); choline, hyoscypicrin; hyoscine N-oxide(also in stem, root), hyoscine(leaves); apohyoscine, α and β-belladonine, Skimmianine (aerial parts); -(-)hyoscyamine N-oxide; ascorbic acid; α-alanine, γ-aminobutyric acid, arginine, aspartic, cysteic and glutamic acids, glycine, hydroxyproline and proline, isoleucine, and leucine, lysine, orninthine, α-phenylalanine, serine, valine and rutin[33].

ACTIONS:

Seeds are intoxicating, narcotic, anodyne, digestive, astringent and anthelmintic. Leaves and Hyoscyamine are sedative, anodyne, antispasmodic, stimulant and mydriatic in effect. Their effect as deliriant are milder than those of belladonna, but greater as hypnotic, and more reliableandrapid, and preferable to morphia and chloral. Laxative, carminative and sedative[10].

USES:

- The herb is used in treatment of asthma and whooping cough because of sedative, cholinergic and antispasmodic properties o its leaves. It also provides relief in gripping pain in intestinal disorder.
- Extracts and tinctures specially prescribed in convulsions, dementia with insomnia, epileptic mania, hiccup, hypochondriasis, irritable affections of bowels, lungs and genitourinary organs, mental excitement, neuralgia, palpitation and spasmodic cough;
- Poultice, plasters and medicated oil prepared from leaves and seeds find in application in inflammatory swellings[10].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Antibacterial Activity of the Seeds of *Hyoscyamus niger* L. (Henbane) BASARAN DULGER*, BEYZA S. GONCU† and FAHRETTIN GUCIN†

The methanolic extract obtained from the seeds of *Hyoscyamus niger* L. (Solanaceae) was investigated for its antibacterial activity against *Bacillus subtilis* ATCC 6633, *Bacillus cereus* ATCC 7064, *Staphylococcus aureus* ATCC 6538P, *Escherichia coli* ATCC 10538, *Proteus vulgaris* ATCC 6899, *Salmonella typhimurium* CCM 5445 and *Pseudomona aeruginosa* ATCC 27853 by disc diffusion and microdilution method. The extracts showed strong antibacterial activity against *Staphylococcus aureus*, with inhibition zones of 25.0 mm and with minimum inhibitory concentrations (MICs) and minimum bactericidal concentrations (MBCs) of 16 (32) μg/mL, respectively. Also, the extracts exhibited moderate activity the other test bacteria. The results demonstrate that the methanolic extract of the seeds of *H. niger* has significant activity and suggest that it may be useful in the treatment of infections[73].

2. Lignanamides and nonalkaloidal components of Hyoscyamus niger seeds. Ma CY1, Liu WK, Che CT.

Abstract

Four lignanamides, a tyramine derivative, and 10 other nonalkaloidal components were isolated from the seeds of Hyoscyamus niger. Among them, hyoscyamide (1), 1,24 tetracosanediol diferulate (6), and 1-O-(9Z,12Z-octadecadienoyl)-3-O-nonadecanoyl glycerol (7) are new structures. The other compounds were identified as grossamide, cannabisin D, cannabisin G, N-trans-feruloyl tyramine, 1-O-octadecanoyl glycerol, 1-O-(9Z,12Z octadecadienoyl) glycerol, 1-O-(9Z,12Z-octadecadienoyl)-2-O-(9Z,12Z-octadecadienoyl) glycerol, 1-O-(9Z,12Z-octadecadienoyl)-3-O-(9Z-octadecenoyl) glycerol, rutin, vanillic acid, beta-sitosterol, and daucosterol. Grossamide, and cannabisins D and G exhibited moderate cytotoxicity in cultured LNCaP human prostate cancer cells[74].

3. **Propensity of *Hyoscyamus niger* seeds methanolic extract to allay stereotaxically rotenone-induced Parkinson's disease symptoms in rats** Dharmendra Kumar Khatri Archana Ramesh JuvekarEmail author

Abstract

Hyoscyamus niger (L), of Solanaceae family, commonly known as henbane is used in the traditional Indian medical system of Ayurveda and Chinese system of medicine for the nervous system disorders. We have evaluated neuroprotective potential of methanol extract of *Hyoscymus Niger* (MHN) seeds in stereotaxically induced rotenone model of Parkinson's disease in rats. MHN was characterized employing HPLC-UV and LCMS. The extract showed presence of L-dopa with significant inhibition in DPPH, ABTS in-vitro assay and monoamine oxidase activity. Male Wistar rats were pretreated with MHN (125, 250, 500 mg/kg body weight *p.o.*) once daily for 7 days and subjected to unilateral intrastriatal injection of rotenone (8 μg in 0.1 % ascorbic acid in normal saline). Three weeks after rotenone infusion, rats were tested for neurobehavioral activity and were sacrificed for estimation of lipid peroxidation (TBARS), total glutathione (GSH) content, and activity of antioxidant enzymes glutathione peroxidase (GPx), catalase (CAT), and superoxide dismutase (SOD) in brain homogenates. Administration of the MHN (containing L-DOPA) significantly attenuated motor disabilities (actophotometer, rotarod and Morris water maze test). Rat treated with rotenone showed reduced levels of thiobarbituric acid reactive substance (TBARS) and increased level of GSH content and antioxidants enzymes activities (GPX, SOD and CAT) in the MHN treated PD rat. The findings suggest that MHN is a potential drug for treating oxidative damage, physiological abnormalities and is effective in neuroprotection in experimental models of PD[75].

4. Antimicrobial activity of the seeds of *Hyoscyamus niger* L. (Henbane) on microorganisms isolated from urinary tract infections Gorkem Dulger, Basaran Dulger

Abstract

Objective:

The methanol extracts obtained from the seeds of *Hyoscyamus niger* L. (Solanaceae) were investigated for their antimicrobial activities against the pathogens causing complicated urine tract infections.

Methods:

The seeds of plant were extracted with aqueous 60% methanol. The extract was screened against urinary tract pathogens (*Enterococcus faecalis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Proteus mirabilis* and *Candida albicans*) by disc diffusion method and microdilution method. Some antibacterial and antifungal antibiotics were used as a positive reference standard to determine the sensitivity of the strains.

Results:

The extracts showed strong antimicrobial activity against *Enterococcus faecalis*, *Klebsiella pneumoniae* and *Candida albicans* with inhibition zones of 26.0, 19.0 and 16.0 mm, with MIC's and MBC's or MFC's of 4.0(8.0), `against the other test microorganisms.

Conclusion:

Our findings support the use of Hyoscyamus niger L. in traditional medicine for the treatment against the urine tract pathogens[76].

5. Seed Alkaloids Content and Antioxidant Enzymes Activity in Black Henbane as Influenced by Ammonium Nitrate Application and Water Deficit Stress **Ghorbanpour M (Ph.D.)[1]*, Ghafarzadegan R (M.Sc.)[2], Hatami M (Ph.D.)[1]**

Abstract:

Background:

Since alkaloids are nitrogenous compounds, the availability of nitrogen (N) is expected to play an important role in the biosynthesis and accumulation of alkaloids in plants.

Objective:

This study intended to investigate the nitrogen (N) fertilization and water deficit stress (WDS) effects on seed tropane alkaloids elicitation including hyoscyamine (HYO) and scopolamine (SCO), and also antioxidant enzymes activities variations including superoxide dismutase (SOD), peroxidase (POX) and catalase (CAT) in black henbane. **Methods**:

Plants were treated with different nitrogen (0, 0.14, 0.28 and 0.56 g N pot-1 as ammonium nitrate, N0-N3, respectively) and WDS treatments (30, 60 and 90% depletion of water from field capacity, W1-W3). Alkaloids extracted were identified by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) analysis. Results: Results showed that the highest alkaloid content values in seeds (HYO: 0.145% dw; and SCO: 0.271% dw) achieved in plants grown under sever (W3) and moderate (W2) WDS accompanied with nitrogen supply of 0.28 g N pot-1 (N2), respectively. The maximum and minimum (2.112 and 0.114 g.plant-1) total alkaloids yield were obtained in N3W1 and N3W3 treatments, respectively. Furthermore, SOD activity increased with increasing N fertilization in all WDS treatments. CAT activity increased with WDS up to 60% FC, and then decreased with WDS increase. The POX activity was the opposite to that of CAT activity with N application under WDS levels.

Conclusion:

Our results suggest that N in appropriate level may act as a modifier for seed physiological responses and as an elicitor for tropane alkaloids biosynthesis pathway in black henbane (*hyoscyamus niger*) plants[77].

6. Black henbane and its toxicity – a descriptive review Anahita Alizadeh1, Mohammad Moshiri 2,3, Javad Alizadeh4, Mahdi Balali-Mood5

Abstract

Black henbane (BH) or *Hyoscyamus niger*, has been used as a medicine since last centuries and has been described in all traditional medicines. It applies as a herbal medicine, but may induce intoxication accidentally or intentionally. All part of BH including leaves, seeds and roots contain some alkaloids such as Hyoscyamine, Atropine, Tropane and Scopolamine. BH has pharmacological effects like bronchodilating, antisecretory, urinary bladder relaxant, spasmolytic, hypnotic, hallucinogenic, pupil dilating, sedative and anti-diarrheal properties. Clinical manifestations of acute BH

poisoning are very wide which include mydriasis, tachycardia, arrhythmia, agitation, convulsion and coma, dry mouth, thirst, slurred speech, difficulty speaking, dysphagia, warm flushed skin, pyrexia, nausea, vomiting, headache, blurred vision and photophobia, urinary retention, distension of the bladder, drowsiness, hyper reflexia, auditory, visual or tactile hallucinations, confusion, disorientation, delirium, aggressiveness, and combative behavior. The main treatment of BH intoxicated patients is supportive therapies including gastric emptying (not by Ipecac), administration of activated charcoal and benzodiazepines. Health care providers and physicians particularly emergency physicians and clinical toxicologists should know the nature, medical uses, clinical features, diagnosis and management of BH poisoning[78].

7. Assessment of *Hyoscyamus niger* seeds alcoholic extract effects on acute and chronic pain in male NMRI rats Mohammad Hassan Ghosian1 , Mohammad Moradi 2* , Esmat Yaghout poor

Abstract:

Background and Objective:

Recent studies have shown that anticholinergic alkaloids compounds have strong analgesic effects. Due to presence of anticholinergic alkaloids in Hyoscyamus niger and its mentioned effects in Iranian traditional medicine, its analgesic effects were assessed. At first, acute and chronic pain thresholds in male NMRI rats with formalin test was evaluated, then oral and injection forms of alcoholic extract of *Hyoscyamus niger* seeds were assessed.

Materials and Methods:

Male NMRI rats weighted 300-350 g were randomly selected. Alcoholic extracts of *Hyoscyamus niger* seeds with 500, 1000 and 2000 mg/kg of body weight were injected intraperitoneally (10 rats per group). Also, *Hyoscyamus niger* seeds was prescribed orally with a proportion of 1 to 14 in their standard food to another group of rats (n=8) within 2 weeks. After all, acute and chronic pain were evaluated in control group rats (n=8) and aforementioned rats with formalin test. Moreover its analgesic effects were compared with sodium salicylate.

Results:

Statistical analyses show that injection of *Hyoscyamus niger* seeds alcoholic extract with the mentioned dosage reduces the acute and chronic pain induced by

formalin test significantly (P<0.001). Also, orally prescribed *Hyoscyamus niger* seeds significantly increased chronic pain threshold.

Conclusion:

The results of this investigation revealed that injection of *Hyoscyamus niger* seeds extract with the above dosages have a significant analgesic effect on acute and chronic pain thresholds. Additionally, orally prescribed only affects chronic pain in formalin test, which indicates different mechanisms Sof parenteral and oral on acute pain[79].

கோட்டம்

வேறு பெயர்:

கோஷ்டம், குரா, ஒலி.

இது அபினிக்குப் பதிலாக இதனைப் புகை பிடித்து வந்தனர் என்று கூறப்படுகின்றது. இப்புகையால் தூக்கமுண்டாகும். இதன் வேர், பூச்சி கடிக்காமலிருக்கவும் அதன் மணத்திற்காகவும் கையாளப்படுகின்றது.

இதில் இருவிதமுண்டு. வெண்கோட்டம், செங்கோட்டம்.

பயன்ப்படும் உறுப்பு - வேர்

சுவை - கைப்பு, விறுவிறுப்பு

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

பசித்தீத்தூண்டி

கோழையகற்றி

உரமாக்கி

வெப்பமுண்டாக்கி

வியர்வைப்பெருக்கி

குணம்:

திட்டிகவுள் அகடுகளுஞ் சென்னி நாவாய்
செறிபிணிவெப் பதைப்புதா வர்த்தம் ஊதை
முட்டியெழு முளைவிரணம் சுவாச காசம்
மூடிகத்தோ டரவுமர விடங்கள் மேகக்
கட்டிஅஜ கல்லிவிட பாகம் பூத
கணம்பால கிரகமொடு தாது நட்டஞ்
சொட்டிவரு பிரமிபித்தம் இவையொ ருங்கே
தொலையும்விர ணாரிக்குச் சுகப்போறாமே.

இதனால், கண், தாடை, வயிறு, கழுத்து, தலை, நா, வாய், இவ்விடத்திலுண்டாகும் நோய்கள், சுரம், அதைப்பு, வாயு, மூலமுளை, புண், இரைப்பு, எலி, பாம்பு முதலியவைகளின் நஞ்சுகள், மேகக்கட்டி, பயித்தியம் இவைபோம்.

வழக்கு:

- கோட்டம், தனியா இவைகளை ஒர் எடை எடுத்து அரைத்துப் பூச, மண்டைப் புண் நீங்கும்.
- கோட்டத்தை நாரத்தைச் சாற்றில் ஊறவைத்து உலர்த்திப் பொடி செய்து, தேன்கூட்டி, முகக்குரு, வங்கு இவைகளுக்குப் பூச குணமுண்டாகும்[7].

சேரும் மருந்துகள்:

- வசந்த குசுமகரம்
- அமிர்ததாதிக் குளிகை
- கோரோசனை மாத்திரை
- கேசரி இளகம்
- வல்லாரைநெய்[30]

SAUSSUREA LAPPA

The plant is found growing wild in central, North-Western, and North-Eastern Himalayas, at an elevation of 2200 – 2800 m. The herb is also cultivated extensively in Lahul and spiti valleys of Himachal Pradesh[43].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Superdivision	: Embryophyta
Division	: Tracheophyta
Class	: Magnoliopsida
Order	: Asterales.
Family	: Asteraceae
Genus	: Saussurea.
Species	: Saussurea Costus[38].

CHEMICAL CONSTITUENTS:

Major: Volatile oil, Saussurine, Costol, Saussureal.

Minor: Saussurealdehyde, Isodehydrocostuslactone, 4-β-Methoxydehydrocostuslactone, dehydrocostuslactone and Costunolide, Shikokiols, Saussureolide, Saussureamine-A, B, D&E. Besides it has been reported to contain b-costene,a-ionone, phellandrene, stigmasterol, resin etc[43].

ACTION:

Aphrodisiac, alterative, anthelmintic, emmenagogue, carminative, analgesic, tonic.

USES:

- In Unani it is used to cure the diseases of blood, the liver and the Kidney; Cures headache, deafness, pain in the chest and in the joints, paralysis, asthma, cough, inflammations, ophthalmia, old fevers.
- The root is prescribed for stomachic and tonic, and the advanced stage of typhous fever. In the Punjab, applied in powder, to Ulcers, for worms in wounds, and also in rheumatism; also considered depurative and aphrodisiac (Murray).
- In snake-bite, the root is given internally in powder form or in the form of a decoction.
- As a medicine the root is considered as carminative and stimulant in china[10].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Comparative Acute Toxicity Studies of Selected Indigenous Herbal Plants in Swiss Albino Mice Ram Garg1 , Rahul Kumar1 , Deepak Nathiya1 , Omprakash Goshain2 , Vinita Trivedi3 , Ashish Kumar Sharma1 ,Krishna Mur

Abstract:

Objective:

Toxicology may be defined as the study of harmful / poisonous effects of drugs and other chemicals with emphasis on detection, prevention and treatment of poisonings. The present study was aimed to determine LD50 and to establish the safety margin of different solvent extracts of selected herbal plants sources namely Saussurea lappa (Root), Ficus bengallensis (Root), Flacourtria romantchi (stem bark and Root), andOroxyllum indicum (Root) by acute toxicity study in Swiss albino mice as per

OECD guideline 425. Methods: Swiss albino mice were sequentially administered all the extracts in single dosages of 250, 500, 750, 1000, 1500, 2000 mg/kg of body weight. All the animals were individually studied for mortality, wellness parameters and body weight for 24 hours. Results: No mortality and no significant changes were observed in body weight and wellness parameters at 250, 500 and 750 mg/kg body wt. doses, which reveal the safety of these extracts in the doses up to 1000 mg/kg body weight. Conclusion: Conclusively, LD50 value of all extracts of Saussurea lappa (Root), Ficus bengallensis (Root), Flacourtria romantchi (stem bark and Root), and Oroxyllum indicum was found to be more than 1000 mg/kg body weight[80].

2. Anti-oxidant Activity of *Saussurea lappa* C.B. Clarke Roots Kyung-Mi Chang, Soo-Im Choi, and Gun-Hee Kim Plant Resources Research Institute, Duksung Women's University, Seoul 132-714, Korea

Abstract

This study was performed to investigate the potential use of *Saussurea lappa* C.B. Clarke as a source of antioxidant agents. Various solvent fractionates from *S. lappa* C.B. Clarke roots were investigated for their anti-oxidative effectiveness. The contents of total phenolics and flavonoids were determined by the Folin-Ciocalteu's colorimetric and the aluminum nitrate method, respectively. Total phenolic and flavonoid contents of *n*-butanol soluble fractionates from S. lappa C.B. Clarke, 44.43 μg gallic acid equilibrium (GAE)/g extract and 92.15 μg quercetin equilibrium (QE)/g extract, respectively, were higher than those of other solvent fractionates. The *n*-butanol soluble fractionates of S. lappa C.B. Clarke (1,000 ppm) showed the strongest inhibitory potential on 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical and reducing power at 92.98% and 0.38, respectively. Thus, our data shows that the S. lappa C.B. Clarke plant may help prevent antioxidative stress[81].

3. Antihepatotoxic activity of Saussurea lappa extract on D-galactosamine and lipopolysaccharide-induced hepatitis in mice Yaeesh S1, Jamal Q, Shah AJ, Gilani A

Abstract

The effects of aqueous-methanol extract of Saussurea lappa Clarke root (Sl.Cr) was investigated against D-galactosamine (D-GalN) and lipopolysaccharide (LPS)-induced hepatitis in mice. Co-administration of D-GalN (700 mg/kg) and LPS (1

microg/kg) significantly raised the plasma transaminase levels (ALT/AST) as compared to the control group ($p < 0.05$). Pretreatment of mice with different doses of Sl.Cr (150, 300 and 600 mg/kg) significantly prevented the D-GalN and LPS-induced rise in plasma levels of ALT and AST in a dose-dependent manner ($p < 0.05$). Post-treatment with Sl.Cr (600 mg/kg) significantly restricted the progression of hepatic damage induced by D-GalN and LPS ($p < 0.05$). The improvement in plasma enzyme levels was further verified by histopathology of the liver, which showed improved architecture, absence of parenchyma congestion, decreased cellular swelling and apoptotic cells in treatment groups as compared to the toxin group of animals. These data indicate that the Sl.Cr exhibits hepatoprotective effect in mice and this study rationalize the traditional use of this plant in liver disorders[82].

4. ***Saussurea lappa*** **induces G2-growth arrest and apoptosis in AGS gastric cancer cells** Seong Gyu Ko[§,¶], Hwang-Phill Kim[§], Dong-Hoon Jin[ϕ], Hyun-Su Bae[$], Sung Hoon Kim[Ω], Chong-Hyeong Park[*], and Jung Weon Lee[§,Ψ,#].

Absract

The molecular effects of *Saussurea lappa* extracts, a traditional medicine in Eastern Asia, on the fate of gastric carcinoma have not been understood. In this study, its cytostatic effects were examined using gastric AGS cancer cells. Its treatment resulted in apoptosis and G2-arrest in a dose- and time-dependent manner. The effects were attributed to the regulation of cyclins and pro-apoptotic molecules and suppression of anti-apoptotic molecules. Therefore, these results suggest that extracts of *Saussurea lappa* root may be a candidate to deal with gastric cancers either by traditional herbal therapy or by combinational therapy with conventional chemotherapy[83].

5.**Anticancer activity of Saussurea lappa extract by apoptotic pathway in KB human oral cancer cells.** Moon SM1, Yun SJ, Kook JK, Kim HJ, Choi MS, Park BR, Kim SG, Kim BO, Lee SY, Ahn H, Chun HS, Kim DK, Kim CS.

Abstract

Saussurea lappa Dence (Compositae) is used as a traditional herbal medicine to treat abdominal pain and tenesmus in East Asia. Current studies have shown that S. lappa

has anticancer activity in divergent of cancer cells. However, the effects of S. lappa on oral cancer and its mechanisms of action have yet to be elucidated.

OBJECTIVE*:*

To explore its potential chemotherapeutic effects and mechanism of cell growth inhibition on human oral cancer cells.

MATERIALS AND METHODS*:*

The dried roots of S. lappa were used in this study. Cell viability of KB cells was evaluated by 3-[4, 5-dimethylthiazol-2-yl]-2, 5-diphenyltetrazolium bromide assay after treatment with 30 μg/ml of methanol extract from the dried roots of S. lappa. To understand whether its effect on cell death is related with apoptosis pathway, we performed DNA fragmentation assay, western blot, caspase activity assay and fluorescence-activated cell sorting (FACS) analysis.

RESULTS:

Treatment of S. lappa extract onto KB cells reduced cell viability significantly with an IC50 value of 30 μg/ml. The formation of a DNA ladder was observed starting at the 24 h treatment. In western blotting analysis, the S. lappa extract induced the proteolytic processing of caspase-3, -9 and poly (ADP-ribose) polymerase, a significant increase of Bax and marked reduction of Bcl-2. We also confirmed the activation of caspase-3/-7 in living KB cells by fluorescence microscopy.

CONCLUSION:

These results suggested that S. lappa extract inhibited cell proliferation through the apoptosis pathway in KB human oral cancer cells[84].

5. Saussurea lappa extract modulates cell mediated and humoral immune response in mice Ravi Shankar Pandey SLT Institute of Pharmaceutical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G

Abstract

In the present study immune pharmacological properties of hydro alcoholic extract of Saussurea lappa C.B. Clarke root have been investigated. After administration of extract in doses of 100 and 200 mg/kg body weight a significant increase in leukocyte count, spleen weight, phagocytic index and antibody secreting cells were noticed. Treatment with extract enhanced DTH reaction, which is reflected from the increased footpad thickness. Saussurea lappa extract treatment also reduced the total number of

animals showing anaphylactic symptoms. At the low dose (100 mg/kg) Saussurea lappa extract did not affect the humoral immune response but at higher dose (200 mg/kg) produced a significant enhancement in antibody titre value. The results suggest that bio active compound of Saussurea lappa influences both humoral as well as cell mediated immune system[85].

6.Saussurea lappa extract suppresses TPA-induced cell invasion via inhibition of NF-κB-dependent MMP-9 expression in MCF-7 breast cancer cells Ha-Rim Kim1,10† , Jeong-Mi Kim , Mi-Seong Kim , Jin-Ki Hwang1 , Yeon-Ju Park1 , Sei-Hoon Yang2 , Hye-Jung Kim3 , Do-Gon Ryu4 , Dong-Sung Lee , Hyuncheol Oh5,6,7, Youn-Chul Kim, Yun-Jin Rhee , Byung-Soon Moon , Jong-Min Yun9 , Kang-Beom Kwon and Young-Rae Lee1,

Abstract Background:

Saussurea lappa (SL) has been used as a traditional herbal medicine to treat abdominal pain and tenesmus, and has been suggested to possess various biological activities, including anti-tumor, anti-ulcer, anti-inflammatory, anti-viral, and cardiotonic activities. The effect of SL on breast cancer metastasis, however, is unknown. Cell migration and invasion are crucial in neoplastic metastasis. Matrix metalloproteinase-9 (MMP-9), which degrades the extracellular matrix, is a major component in cancer cell invasion. Methods: Cell viability was examined by MTT assay, whereas cell motility was measured by invasion assay. Western blot, Real-time PCR, and Zymography assays were used to investigate the inhibitory effects of ESL on matrix metalloproteinase-9 (MMP-9) expression level in MCF-7 cells. EMSA confirmed the inhibitory effects of ESL on DNA binding of NF- κB in MCF-7 cells. Results: Cells threated with various concentrations of Saussurea lappa (ESL) for 24 h. Concentrations of 2 or 4 μM did not lead to a significant change in cell viability or morphology. Therefore, subsequent experiments utilized the optimal non-toxic concentration (2 or 4 μM) of ESL. In this study, we investigated the inhibitory effect of ethanol extract of ESL on MMP-9 expression and cell invasion in 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced MCF-7 cells. ESL inhibited the TPA-induced transcriptional activation of nuclear factor-kappa B (NF-κB). However, this result obtained that ESL did not block the TPA-induced phosphorylation of the kinases: p38, ERK, and JNK. Therefore, ELS-mediated inhibition of TPA-induced MMP-9 expression and cell invasion involves the suppression of NF-kB

pathway in MCF-7 cells. Conclusions: These results indicate that ELS-mediated inhibition of TPA-induced MMP-9 expression and cell invasion involves the suppression of NF-kB pathway in MCF-7 cells. Thus, ESL has potential for controlling breast cancer invasiveness in vitro[86]

7. Lead Screening for CXCR4 of the Human HIV Infection Receptor Inhibited by Traditional Chinese Medicine Tzu-Chieh Hung,[1] Wen-Yuan Lee,[1,2,3] Kuen-Bao Chen,[1,2,4] and Calvin Yu-Chian Chen

Abstract:

The acquired immunodeficiency syndrome (AIDS) is a serious worldwide disease caused by the human immunodeficiency virus (HIV) infection. Recent research has pointed out that the G protein-coupled chemokine receptor CXCR4 and the coreceptor C-C chemokine receptor type 5 (CCR5) are important targets for HIV infection. The traditional Chinese medicine (TCM) database has been screened for candidate compounds by simulating molecular docking and molecular dynamics against HIV. Saussureamine C, 5-hydroxy-L-tryptophan, and diiodotyrosine are selected based on the highest docking score. The molecular dynamics is helpful in the analysis and detection of protein-ligand interactions. According to the analysis of docking poses, hydrophobic interactions, hydrogen bond variations, and the comparison of the effect on CXCR4 and CCR5, these results indicate Saussureamine C may have better effect on these two receptors. But for some considerations, diiodotyrosine could make the largest variation and may have some efficacy contrary to expectations[87]

நெல்லி

வேறு பெயர்:

ஆமலகம், ஆலகம், ஆம்பல், ஆமரிகம், தாத்தாரி, தாத்திரி, கோரங்கம், மிறுதுபலா, மீதுந்து.

இதன் பழம் பச்சையாயிருக்கும் போது வெண் மஞ்சள் நிறமாகவும், உலர்ந்தபின் கருப்பு நிறமாகவும், இருக்கும். இதற்கே "நெல்லி முள்ளி" என்று பெயர்.

பயன்ப்படும் உறுப்பு - இலை, பூ, பட்டை, வேர், காய், விதை

சுவை - புளிப்பு, துவர்ப்பு, இனிப்பு

தன்மை - தட்பம்

பிரிவு - இனிப்பு[7]

செய்கை:

சீதளகாரி

சங்கோசனகாரி

தாதுஷ்ணரோதி[62]

குணம்:

நல்லநெல்லி முள்ளியது நாவுக் குரிசைதரு
மல்லல் விரிபித்த மஞ்சிடுமே - மெல்லத்
தலைமுழுகக் கண்குளிருந் தாவுபித்த வாந்தி
யிழையிழிமே கங்களும்போ மெண்.

நாவுக்குரிசை தராநின்ற நெல்லிமுள்ளியால் உட்சூடு, மேகரோகம், மாதர்கள் ருதுதோஷம், அஸ்திராசிராவம், தூம்பிரம், தாகம், ரத்தபித்தம், விந்துநட்டம், மூத்துர அருகல், ஆண்குறிக் கொப்புளம், பயித்தியம், பித்தவாந்தி, பிரமேகம் ஆகியன விலகும். இதை அரைத்துச் சிரசுக்கிட்டு முழுக நேத்திரங் குளிரும் எங்க[7].

சேரும் மருந்துகள்:

- மகாஏலாதி சூரணம்
- தாளிசபத்திரி சூரணம்
- வில்வாதி இலேகியம்
- நெல்லிக்காய் இலேகியம்
- கந்தக இரசாயணம்[29]

- மகா பறங்கிச்சக்கை இலேகியம்[29]
- ஜோதிரச மாத்திரை

EMBLICA OFFICINALIS

It is found both in the wild and cultivated state. Common in the mixed deciduous forest in India ascending to 1300 m on the hills[43].

SYNONYMS:

Sanskrit: Dhatri-phala; Amraphalam; Amalakam; Amalaki; Vayastha**. English:** Emblic Myrobalan; Indian gooseberry. **Hindi:** Amla; Aoula; Aura; Amlika; Anvurah**. Bengali:** Amlaki; Amla. **Malayalam:** Nellikai. **Punjabi:** Ambli; Ambul; Ambal; Amla. **Gujarati:** Ambala; Amla. **Arabic:** Amlaj. **Assam:** Amluki. **Tamil:** Toppi; Nellikai **Telugu:** Nelli[10].

TAXONOMICAL CLASSIFICATION:

Kingdom	: Plantae
Subkingdom	: Viridiplantae
Superdivision	: Embryophyta
Division	: Tracheophyta
Class	: Magnoliopsida
Order	: Malpighiales
Family	: Phyllanthaeae
Genus	: Phyllanthus L.
Species	: Phyllanthus Emblica L[38].

PARTS USED:

Dried fruit, the nut or seed, leaves, root, bark and flowers. Ripe fruits used generally fresh, dry also used[10].

CHEMICAL CONSTITUENTS:

Major: Vitamin C (=L-(+)-threo-ascorbic acid,~2%); tannins (~5%) viz, gallic acid, ellagic acid, phyllemblic acid and emblicol.

Others: Alkaloids viz., phyllantidine and phyllantine; pectin and minerals[43].

ACTIONS:

- Fresh fruit is refrigerant, diuretic and laxatives. Green fruit is exceedingly. Fruit is also carminative and stomachic. Dried fruit is sour and astringent. Flowers are cooling and aperients. Bark is astringent.
- Emblica officinalis is effective in the treatment of peptic ulcer and in dyspepsia. The fruits exhibit hypolipidaemic and antiatherosclerotic effects in rabbits and rats. The fruit extract has antimutagenic activity on certain directly acting mutagens in some strains of Salmonella typhimurium. The extract of amla also has antimicrobial properties. Amlaki is an antioxidant with free radical scavenging properties which may be due to the presence of high levels of super oxide dismutase[10].

USES:

- Fresh fruit is used in Turkeystan in inflammation of the lungs and of the eyes as a collytium. In Persia it is used as a vermifuge; juice of fruit is used; it is generally given with honey; the dose is from 1 to 3 drachms. The green fruits are made into pickles and preserves to stimulate appetite.
- In Unani it is used as refrigerant, heart tonic, tonic to brain, prevents vicious humours in stomach and intestines. Used in chronic diarrhoea, in the convalescent stage of typhoid and other fevers[10].

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Investigation into mechanism of action of anti-diabetic activity of *Emblica officinalis* on streptozotocin induced type I diabetic rat PR Tirgar*, KV Shah, VP Patel, TR Desai, RK Goya

Abstract

Objective of present investigation was to study anti-diabetic activity of fresh juice and hydro-alcoholic extract of fruits of *Emblica officinalis* Gaertn. (Euphorbiaceae) in streptozotocin(STZ) induce type 1 diabetic rats. Wistar rats were made diabetic with streptozotocin. Animals were divided into four groups namely non diabetic control,

diabetic control, diabetic treated with fresh fruit juice and hydro-alcoholic extract of fruits of *E. officinalis*. Diabetic treated group received fresh juice and hydro-alcoholic extract of *E. officinali*, daily for four weeks. Control group received distilled water. STZ induced diabetic rats shows significant loss of body weight, polyuria and polydypsia. In STZ-diabetic rats, there was significant decrease in serum insulin levels and AUCinsulin associated with significant increase in fasting BSL and AUCglucose. Treatment with fresh juice and hydro-alcoholic extract significantly reduced elevated fastilng glucose and AUCglucose levels in type I diabetic rats. Treatment with fresh juice and hydro-alcoholic extract produce significant increase in serum insulin level and AUCinsulin of diabetic rats compared to that of diabetic control. In conclusion, our data suggests, fresh juice and hydroalcoholic extract of *E. officinalis* fruits possesses potential anti-diabetic activitiy in STZ induce type 1 diabetic rat[88].

2. **Current Trends in the Research of Emblica officinalis (Amla):A Pharmacological Perspective** Swetha Dasaroju*, Krishna Mohan Gottumukkala Centre for Pharmaceutical Sciences (CPS), Institute of Science and Technology (IST), Jawaharlal Nehru Technological University –Hyderabad (JNTUH), Andhra Pradesh, India

Abstract

Phyllanthus emblica Linn. Or *Emblica officinalis* Gaertn. commonly known as Indian gooseberry or *Amla* is one of the most important medicinal plants in Indian traditional systems of medicine (Ayurveda, Unani and Siddha). It is a well-known fact that all parts of amla are useful in the treatment of various diseases. Among all, the most important part is *fruit*. Amla fruit is widely used in the Indian system of medicine as diuretic, laxative, liver tonic, refrigerant, stomachic, restorative, anti-pyretic, hair tonic, ulcer preventive and for common cold, fever; as alone or in combination with other plants. Phytochemical studies on amla disclosed major chemical constituents including tannins, alkaloids, polyphenols, vitamins and minerals. Gallic acid, ellagic acid, emblicanin A & B, phyllembein, quercetin and ascorbic acid are found to be biologically effective. Research reports on amla reveals its analgesic, anti-tussive, antiatherogenic, adaptogenic; cardio, gastro, nephro and neuroprotective, chemopreventive, radio and chemo modulatory and anticancer properties. Amla is also reported to possess potent free radical scavenging, antioxidant, anti-inflammatory, anti-mutagenic, immunomodulatory activities, which are efficacious in the prevention and treatment of various diseases like

cancer, atherosclerosis, diabetes, liver and heart diseases. In this article, we discuss the nutritional value, biochemical constituents, traditional uses, medicinal value of amla and its use as a household remedy. We also emphasized the mechanisms behind the pharmacological activities based on the recent research reports and tried to summarize the results of research done from the past 5 years with proper specifications on the future prospects in a pharmacological perspective[89].

3.evaluation of physicochemical and preliminary phytochemical studies on the fruit of emblica officinalis gaertn ak meena*, arjun singh, mm rao

Abstract

The present communication attempts to evaluate the physicochemical and preliminary phytochemical studies on the fruit of *Emblica officinalis* Gaertn, Euphorbiaceae family. Amla is one of the most celebrated herbs in the Indian traditional medicine system, Ayurveda. Amla traditional uses include as a laxative, eye wash, appetite stimulant, restorative tonic, and to treat anorexia, indigestion, diarrhea, anemia, and jaundice. Amla is becoming increasingly well known for its unusually high levels of Vitamin C, which is resistant to storage and heat damage due to cooking. It is found natively in India. Indian gooseberry has been used as valuable ingredient of various medicines in India and abroad. As there is no detailed standardisation work reported on fruit, the physicochemical parameters, preliminary phytochemical constants, toxic heavy metals, pesticide residue, and aflatoxin analysis are carried out. The study revealed specific identities for the particular crude drug which will be useful in identification and control to adulterations of the raw drug[90].

4. AMLA – THE ROLE OF AYURVEDIC THERAPEUTIC HERB IN CANCER

M. KRISHNAVENI AND S. MIRUNALINI Department of Biochemistry and Biotechnology, Annamalai University, Tamil Nadu, India.

Abstract

Medicinal plants are part of human society to combat diseases, from the dawn of civilization. *Phyllanthus emblica* (Amla) possesses a vast ethnomedical history and represents a phytochemical reservoir of heuristic medicinal value. It is one of the oldest oriental medicines mentioned in Ayurveda as potential remedy for various ailments. The fruit is rich in quercetin, phyllaemblic compounds, gallic acid, tannins, flavonoids,

pectin, and vitamin C and also contains various polyphenolic compounds. A wide range of phytochemical components including terpenoids, alkaloids, flavonoids, and tannins have been shown to posses' useful biological activities. Many pharmacological studies have demonstrated the ability of the fruit shows antioxidant, anticarcinogenic, antitumour, antigenotoxic, antiinflammatory activities, supporting its traditional uses. In this review, we have focused our interest on phytochemistry, traditional uses, cancer chemopreventive activity of *Phyllanthus emblica* both in vivo and in vitro. In view of its reported pharmacological properties and relative safety, *P.emblica* could be a source of therapeutically useful products[91].

5. **In vitro cytotoxicity of emblica officinalis against different human cancer cell lines** satish k. Verma*1 asima shaban1, rajesh nautiyal1 reena purohit2 santosh singh3 madhvi lata chimat

Abstract

Cancer is a public health problem all over the world. Large numbers of plants and their isolated constituents have been shown to potential anticancer activity. Ethanolic whole plant extract of Emblica officinalis (syn. Phyllanthus emblica L.) showed in vitro cytotoxicity against different human cancer cell lines such as lung, neuroblastima, and colon. There was no growth of inhibition recorded against liver cancer cell line. Sulforhodamine B dye (SRB) assay was done for in vitro cytotoxicity test assay. The in vitro cytotoxicity was performed against five human cancer cell lines namely of lung (A-549), liver (Hep-2) colon (502713 HT-29) and neuroblastima (IMR-32). The activity was done using 100µg/ml of the extract. Against lung (A-549) cell line plant extract showed 82% growth of inhibition. In case of liver (Hep-2) showed no activity reported, where as in case of colon 502713 cell line plant extract showed maximum activity. In case of HT-29 liver human cancer line and IMR-32 neuroblastima cell line plant extract showed 98% and 97% activity respectively[92].

6. Antimutagenic and wound healing activity of Emblica officinalis extract in Swiss Albino mice R.C.Agrawal,* Rajni Sharma and **Maheshwari, S.k.

Abstract

Single application of Emblica ext. at the dose of 50 ,100 and 150 mg/kg body weight ,24hours prior the i.p. administration of Cyclophosphamide (at the dose of 50

mg/kg) have significantly prevented the micronucleus formations and chromosomal aberrations in dose dependent manner in bone marrow cells of mice as compared to Cyclophosphamide group. However, Emblica ext alone has not induced any micronucleus formations and chromosomal aberrations in bone marrow cells as compared to control group. In another experiment, topical application of Emblica extract at the dose of 500 mg/kg b.wt. have shown wound healing activity on the skin of Swiss mice. The wound created by excision method was almost healed after 21 days but in 8-15 days the wound healing by Emblica extract was greater than Betadine treated group (Positive control). The above studies showed the Chemopreventive potential of Embelica extract which is an important plant used in Aruvedic preparations of medicine[93].

7. Emblica officinalis Extract Induces Autophagy and Inhibits Human Ovarian Cancer Cell Proliferation, Angiogenesis, Growth of Mouse Xenograft Tumors Alok De1*, Archana De2, Chris Papasian3, Shane Hentges4, Snigdha Banerjee2,5, Inamul Haque2,5, Sushanta K. Banerjee2,5,6

Abstract

Patients with ovarian cancer (OC) may be treated with surgery, chemotherapy and/or radiation therapy, although none of these strategies are very effective. Several plant-based natural products/dietary supplements, including extracts from Emblica officinalis (Amla), have demonstrated potent anti-neoplastic properties. In this study we determined that Amla extract (AE) has anti-proliferative effects on OC cells under both in vitro and in vivo conditions. We also determined the anti-proliferative effects one of the components of AE, quercetin, on OC cells under in vitro conditions. AE did not induce apoptotic cell death, but did significantly increase the expression of the autophagic proteins beclin1 and LC3B-II under in vitro conditions. Quercetin also increased the expression of the autophagic proteins beclin1 and LC3B-II under in vitro conditions. AE also significantly reduced the expression of several angiogenic genes, including hypoxia-inducible factor 1α (HIF-1α) in OVCAR3 cells. AE acted synergistically with cisplatin to reduce cell proliferation and increase expression of the autophagic proteins beclin1 and LC3B-II under in vitro conditions. AE also had anti-proliferative effects and induced the expression of the autophagic proteins beclin1 and LC3B-II in mouse xenograft tumors. Additionally, AE reduced endothelial cell antigen – CD31 positive blood vessels and HIF-1α expression in mouse xenograft tumors.

Together, these studies indicate that AE inhibits OC cell growth both in vitro and in vivo possibly via inhibition of angiogenesis and activation of autophagy in OC. Thus AE may prove useful as an alternative or adjunct therapeutic approach in helping to fight OC[94].

8. Analgesic Effect of Indian Gooseberry (Emblica officinalis Fruit) Extracts on Postoperative and Neuropathic Pain in Rats Dong Wook Lim 1,†, Jae Goo Kim 1,† and Yun Tai Kim

Abstract:

Indian gooseberry (Emblica officinalis fruit), also known as "Amla" is one of the oldest edible fruits known in India. It has also traditionally been used to treat inflammation, and as an analgesic to treat wounds. However, experimental evidence for the analgesic effects of E. officinalis has been lacking. The present study investigated whether E. officinalis extracts exhibit analgesic effects in the plantar incision (PI) and spared nerve injury (SNI) pain-model rats. We evaluated the mechanical withdrawal threshold (MWT) using von Frey filaments, and pain-related behavior was determined after surgery based on ultrasonic vocalization (USV). The group treated with E. officinalis extracts at 300 mg/kg had significantly increased MWT values at 6 h and 24 h after the PI, and had a significantly reduced number of 22–27-kHz USVs at 6 h and 24 h after PI. Moreover, after 15 days of continuous treatment with E. officinalis extracts, the treated group showed significantly alleviated SNI-induced hypersensitivity and reduced pro-inflammatory cytokine levels. Thus, E. officinalis extracts have potential analgesic effects in both postoperative and neuropathic pain models in vivo[95].

வெற்றிலை காம்பு

வேறு பெயர்:

- தாம்பூலாம், தாம்பூலவல்லி, திரையல், நாகவல்லி, மெல்லிலை, வெள்ளிலை, மெல்லடகு.
- இ஼ைது இந்தியாவில் வெப்ப பாகத்திலும் சதுப்புள்ள இடங்களிலும் பயிர் செய்யப்படும் மரமேறுங் கொடி. இது இலையின் பொருட்டே பயிரிடப்படுகிறது.
- இ஼ைது இலையின் நிறத்தாலும், மணத்தாலும், கார்ப்புச் சுவையாலும் மூவகைப்படும். மிகுந்த மணமும், காரமும், கருப்பு நிறமும் இல்லாதது "வெற்றிலை" கருமையும் காரமும் மிகுந்தது. "கம்மாறு வெற்றிலை" கருப்பூர மணமும், சிறுகாரமுமுடையது "கருப்பூர வெற்றிலை".

பயன்ப்படும் உறுப்பு - இலை

சுவை - விறுவிறுப்பு, கார்ப்பு

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

வெப்பமுண்டாக்கி

அகட்டுவாய்வகற்றி

துவர்ப்பி

காமம்பெருக்கி

அழுகலகற்றி

வெப்பகற்றி

பசித்தீதூண்டி

பாற்பெருக்கி

உமிழ்நீர்ப்பெருக்கி

குணம்:

எட்டிலொன்று கிட்டினீ ரேற்றஞ் சிரோபார

மாட்டி விடுசன்னி மாந்தமொடு- நாட்டிற்

பரியகுரற் கம்மல்வலி பண்டியுப்பி சம்போ

மரியகம் மாறுவெற்றி லை.

இதற்கு நீரேற்றம், தலைபாரம், முப்பிணி, மாந்தம், குரற் கம்மல், வயிற்றுவலி, வயிற்றுப்பிசம் ஆகியவை போம்[7].

சேரும் மருந்துகள்:

வெப்பமுண்டாக்கி

அகட்டுவாய்வகற்றி

துவர்ப்பி

காமம்பெருக்கி

அழுகலகற்றி

PIPER BETTLE

This twining plant is cultivated very extensively in the warm and moist parts of South India and Ceylon for its leaves.

Varieties – "Kali" or black; "Pandhari" or white; "Vehicle"or small; are the chief three varieties of the Bombay presidency.

SYNONYMS:

Sanskrit: Tambula; Ngavalli. **English:** Betel-leaf Pepper. **Hind**i: Pan Tamboli. **Bengali, Punjabi & Gujarati:** Pan. **Telugu**: Naga-valli; Tamalapaku. **Tamil**: Vettilai. **Malayalam**: Vettila. **Arabic**: Tanbol[10].

TAXONOMICAL CLASSIFICATION:

Kingdom	: plantae
Subkingdom	: Viridiplantae
Superdivision	: Embryophyta
Division	: Tracheophyta
Subdivision	: Spermatophytina
Class	: Magnoliopsida
Order	: Piperales
Family	: Piperaceae
Genus	: Piper L.
Species	: Piper bettle L[38].

CHEMICAL CONSTITUENT:

Leaves yield on distillation “a light yellow aromatic odour essential volatile oil of sharp burning taste, aromatic odour” containing betel-phenol (chavi betol). Leaves contaian also an alkaloid “arakene” with properties allied to cocaine..Leaves also contain starch, sugars, tannin, distases,and essential oil. Betel oil also contain terpene and sesquiterpene. Leaves both on middle part of the main vein contain largest quantity f tannin. As regards phenols, the higer quqlity of the leaf’ higher the proportion of esstential oil. The best essential oilis that whch contains large quqntity of phenols as possible. Those varieties of leaf which given an essential oil containing much terpene arevery pingent and coarse[10].

ACTIONS:

Aromatic, stimulant, carminative, astringent, and antiseptic. It also known to produce aprimary stimulation of the central nervous system followed bya kind of inebriety in large doses.

USES:

The leaf juice is given systemically to treat cough and indigestion in children and also as anti-malarial activity, antibacterial activity, antifungal study, insecticidal activities, antioxidant activity, anti-diabetic activity, gastro protective activity, anti-nociceptive activity, cytotoxic activity and anti-platelet.

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Piper betle shows antioxidant activities, inhibits MCF-7 cell proliferation and increases activities of catalase and superoxide dismutase Noor Nazirahanie Abrahim M S Kanthimathi and Azlina Abdul-Aziz1

Abstract

Background:

Breast cancer is the most common form of cancer and the focus on finding chemotherapeutic agents have recently shifted to natural products. Piper betle is a medicinal plant with various biological activities. However, not much data is available

on the anti-cancer effects of P. betle on breast cancer. Due to the current interest in the potential effects of antioxidants from natural products in breast cancer treatment, we investigated the antioxidant activities of the leaves of P. betle and its inhibitory effect on the proliferation of the breast cancer cell line, MCF-7.

Methods:

The leaves of P. betle were extracted with solvents of varying polarities (water, methanol, ethyl acetate and hexane) and their phenolic and flavonoid content were determined using colorimetric assays. Phenolic composition was characterized using HPLC. Antioxidant activities were measured using FRAP, DPPH, superoxide anion, nitric oxide hyroxyl radical scavenging assays. Biological activities of the extracts were analysed using MTT assay and antioxidant enzyme (catalase, superoxide dismutase, glutathione peroxidase) assays in MCF-7 cells.

Results:

Overall, the ethyl acetate extract showed the highest ferric reducing activity and radical scavenging activities against DPPH, superoxide anion and nitric oxide radicals. This extract also contained the highest phenolic content implying the potential contribution of phenolics towards the antioxidant activities. HPLC analyses revealed the presence of catechin, morin and quercetin in the leaves. The ethyl acetate extract also showed the highest inhibitory effect against the proliferation of MCF-7 cells (IC50=65 μg/ml). Treatment of MCF-7 cells with the plant extract increased activities of catalase and superoxide dismutase.

Conclusions:

Ethyl acetate is the optimal solvent for the extraction of compounds with antioxidant and anti-proliferative activities. The increased activities of catalase and superoxide dismutase in the treated cells could alter the antioxidant defense system, potentially contributing towards the anti-proliferative effect. There is great potential for the ethyl acetate extract of P. betle leaf as a source of natural antioxidants and to be developed as therapeutics in cancer treatment[96].

2. Antimicrobial, antioxidative and antihemolytic activity of *piper betel* leaf extracts
Devjani chakraborty*, Barkha shah

Abstract

Piper betel L. belongs to family *Piperaceae* commonly known as *Paan*. It is extensively grown in Srilanka, India, Thailand, Taiwan and other Southeast Asian countries. The leaves are pungent, bitter, sweetish, acrid in nature. It has got large number of biomolecules which show diverse pharmacological activity along with carminative, stomachic, antihelminthic, tonic, aphrodisiac, laxative activities. The leaves are used for treating cough, foul smelling in mouth, ozoena, bronchitis, clears throat, vulnery and styptic. In the present experiment four different extracts (water, methanol, ethyl acetate and petroleum ether) of *Piper betel* leaves were tested against four different pathogenic bacteria namely *Streptococcus pyogenes, Staphylococcus aureus, Proteus vulgaris* and *Escherichia coli*. Further few known and unknown metabolites were isolated from these extracts. Structural elucidations of new metabolites were done by different analytical techniques like NMR, Mass and IR spectroscopy. Later on antioxidative and anti-haemolytic activities were determined. Anti-oxidative studies were done by TBARS and DPPH method. Anti-haemolytic activity was determined using erythrocytes model and the extent of lipid peroxidation of the same was also determined[97].

***3. Piper betel* leaf extract: anticancer benefits and bio-guided fractionation to identify active principles for prostate cancer management** Rutugandha Paranjpe, Sushma R.Gundala, N.Lakshminarayana, Arpana Sagwal, Ghazia Asif, Anjali Pandey and Ritu Aneja.

Plant extracts, a concoction of bioactive non-nutrient phytochemicals, have long served as the most significant source of new leads for anticancer drug development. Explored for their unique medicinal properties, the leaves of *Piper betel*, an evergreen perennial vine, are a reservoir of phenolics with antimutagenic, antitumor and antioxidant activities. Here, we show that oral feeding of betel leaf extract (BLE) significantly inhibited the growth of human prostate xenografts implanted in nude mice compared with vehicle-fed controls. To gain insights into the 'active principles', we performed a bioactivity-guided fractionation of methanolic BLE employing solvents of

different polarity strengths using classical column chromatography. This approach yielded 15 fractions, which were then pooled to 10 using similar retention factors on thin-layer chromatographs. Bioactivity assays demonstrated that one fraction in particular, F2, displayed a 3-fold better *in vitro* efficacy to inhibit proliferation of prostate cancer cells than the parent BLE. The presence of phenols, hydroxychavicol (HC) and chavibetol (CHV), was confirmed in F2 by nuclear magnetic resonance, high-performance liquid chromatography and mass spectroscopy. Further, the HC containing F2 subfraction was found to be ~8-fold more potent than the F2 subfraction that contained CHV, in human prostate cancer PC-3 cells as evaluated by the 3-(4,5-dimethylthiazole-2-yl)-2,5-diphenyl tetrazolium bromide assay. Removing CHV from F2 remarkably decreased the IC50 of this fraction, indicating that HC is perhaps the major bioactive constituent, which is present to an extent of 26.59% in BLE. These data provide evidence that HC is a potential candidate for prostate cancer management and warrants further preclinical evaluation[98].

4. Effects of Consumption of Thamboolam (Conventional Betel Chewing) in Traditional Siddha Medicine Thomas M.Walter, H.Nalini Sofia

Introduction

"Thamboolam" is a name referred to betel leaf, areca nut and slaked lime taken together or considered as a whole. Sometimes cardamom, long pepper, clove, calophyllum aromaticum, nutmeg, mace and dried ginger are also added with them and chewed. Areca nut has a long history of use and is deeply ingrained in many sociocultural and religious activities. The use of betel leaf can be traced as far back as two thousand years. It is described in the most ancient historic book of Ceylon, the Mahavasma, which is written in the Pali language. Areca nut is the seed of the fruit of the oriental palm, Areca catechu. Thin slices of the nut, either natural or processed, may be mixed with a variety of substances including slaked lime (calcium hydroxide) and spices such as cardamom, coconut, and saffron. Most significantly, they may be mixed with tobacco products or wrapped in the leaf of the piper betel plant. Areca nut is used by an estimated 200-400 million people, mainly IndoAsians and Chinese. Betel chewing is considered as a good and cheep source of dietary calcium[99].

5. ***Piper betle*** **extracts exhibit antitumor activity by augmenting antioxidant potential** BADRUL ALAM1, RAJIB MAJUMDER2, SHAHINA AKTER2 and SANG-HAN LEE

Abstract.

The present study was conducted to evaluate the methanolic extract of *Piper betle* leaves (MPBL) and its organic fractions with regard to antitumor activity against Ehrlich ascites carcinoma (EAC) in Swiss albino mice and to confirm their antioxidant activities. At 24 h post-intraperitoneal inoculation of tumor cells into mice, extracts were administered at 25, 50 and 100 mg/kg body weight for nine consecutive days. The antitumor effects of the extracts were then assessed according to tumor volume, packed cell count, viable and non-viable tumor cell count, median survival time and increase in life span of EAC-bearing mice. Next, hematological profiles and serum biochemical parameters were calculated, and antioxidant properties were assessed by estimating lipid peroxidation, reduced glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT) levels. MPBL and the ethylacetate fraction (EPBL) at a dose of 100 mg/kg induced a significant decrease in tumor volume, packed cell volume and viable cell count and increased the life span of the EAC-bearing mice ($P<0.05$). Hematological and serum biochemical profiles were restored to normal levels in the extract-treated mice compared with the EAC control mice. MPBL and EPBL treatment significantly decreased lipid peroxidation ($P<0.05$) and restored GSH, SOD and CAT levels towards normal compared with the EAC control. Taken together, the results of the present study demonstrated that *Piper betle* extracts exhibit significant antitumor activity, which may be attributed to the augmentation of endogenous antioxidant potential[99].

6. A review on *Piper betle* L. Biswajit Patra, Mihir Tanay Das and Surjendu Kumar Dey

Abstract

Betel vine (*Piper betle* L.) belongs to genus *Piper* of the family Piperaceae. Leaves of *Piper betle* posses several bioactivities and are used in traditional medicinal systems. Many research studies on *Piper betle* has reported that it contains important chemical constituents and are acts to arouse action for its medicinal properties like anticancer, anti-allergic, anti-malaria, anti-filarial**,** antibacterial, antifungal study, insecticidal, antioxidant, anti-diabetic, gastro-protective, cyto-toxic, anti-platelet, wound

healing activity, chlorophyllase activity, oral hygiene and anti-asthmatic effect. The present paper also focused on diseases of betel vine and their various symptoms[100].

7. Piper Betle: Phytochemical, Pharmacological and Nutritional Value in Health Management Sunil Kumar Shah*, Gopal Garg, Deenanath Jhade, Narendra Patel

College of Pharmacy, Sri Satya Sai University of Technology and Medical Sciences, Sehore (M.P.), India

Abstract

Many of the health benefits bonded with Piper betel (locally known as Paan) belongs to the Piperaceae or pepper family. It has been an important herb distributed throughout of world. Betle leaves are the most valued part of the plant, in the past were routinely used as a chewing agent to restrict offensive breath and they contain tannins, chavicol, phenyl, propane, sesquiterpene, cyneole, alkaloid, sugar and some essential oil and found various medicinal value, digestive, appetizer, aromatic, expectorant, stimulant, antibacterial, euphoria-inducing, antiprotozoan, carminative, anti-fungal and aphrodisiac etc. The leaves are also supposed to harden the gum, conserve the teeth and to prevent indigestion, bronchitis, constipation, congestion. This review for the first time provides information on therapeutically effects and also addresses the various mechanisms which might be involved[101].

பனை வெல்லம்

வட்டுபன வெல்லத்தால் மார்பெரிச்சல் குன்மமறும்
முட்டுந் திரிதோஷம் முன்னறிகா - கட்டுமடா
வாந்தி ருசியின்மை வாளா யுற்றிடினும்
சாந்தி பெருகுமென்றே சாற்று.

பனை வெல்லத்தால் சுரசந்நிபாதம், திரிதொஷதொந்தங்கள், அரோசகம், குன்மம், மார்புஎரிச்சல் இவை நீங்கும் என்க.

உபயோகிக்கும் முறை:

பனை வெல்லத்தைக் கரைத்து வடிகட்டிப் பாகு எடுத்துப் பச்சை அரிசிமாவு கூட்டி அதிரசமாகச் சுட்டு உண்பதுண்டு. காபி, தேத்தண்ணீர் இவற்றில் சாதாரணமாக அஸ்கா, பூரா முதலிய சர்க்கரைக்குப் பதிலாக இந்த பனைவெல்லத்தைப் போட்டு சாப்பிடுவதுண்டு. இதனால் தேகத்தின் வேப்பம் அடங்கும். பித்தம் தணியும். தேக ஆரோக்கியம் உண்டாகும்[7].

சேரும் மருந்துகள்:

- நவரச மெழுகு
- நீரடிமுத்துவல்லாதி[105]
- மூசாம்பரம மெழுகு[29]

Palm Jaggery

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Jaggery from Palmyrah palm (*Borassus flabellifer* L.)- Present status and scope

Vengaiah PC, Ravindrababu D2, Murthy GN3 & Prasad KR4 Horticultural Research Station, Pandirimamidi-533288, Andhra Pradesh, College of Agricultural Engineering, Bapatla-522101, Andhra Pradesh

Jaggery is a sugar rich product and medicine obtained by evaporation of sugarcane (Saccharum officinarum L.) juice or sap obtained from Palmyrah palm (Borassus flabellifer L.), Date palm (Phoenix dactylifera L.) or Coconut palm (Cocos

nucifera L.). Among all Jaggery, palm Jaggery having its own importance. It usually contains 65-85% sucrose and 5-15% reducing sugars, and is consumed directly or used for preparation of sweet confectionary items and ayurvedic/traditional medicines, and it may have a role to reduce the chance of lung cancer. It is a good source of minerals like calcium, phosphorous and iron. Jaggery industry is one of the most important cottage level industries in India since ancient times and it is prepared mostly by small and marginal farmers. Besides India, countries like Pakistan, Bangladesh, Nepal, Burma and Philippines are also manufacturing Jaggery[103]

2. Physicochemical and thermal properties of candy crystals prepared from palmyra-palm jaggery LEELA CHAUHAN1,2, KUMAR SATYA PRAKASH3, P.P. SRIVASTAV1 and KHALID BASHIR

Abstract

Candy crystals prepared from palmyra palm were analyzed for various physical and chemical properties during processing. The scanning electron microscopy displayed smooth and clear crystals of varied sizes. As the temperature of the jaggery increased from 28C to 108.4C, there was a subsequent increase in the total soluble solids from 28.8 to 848Brix. Thermal conductivity decreased from 0.44 to 0.14 W/mK, thermal diffusivity decreased from 0.31 3 1026 to 0.05 3 1026 m2/s and volumetric specific heat decreased from 1.35 3 103 to 0.64 3 103 kJ/m3_K. Thermal resistivity increased from 201.7 3 1022 to 755.1 3 1022 C_m/W. The maximum force taken as hardness was found to be 6,419 g. Power was found to be best for fitting the viscosity values (R250.93)[104].

பூரம்

அறுபத்து நான்கு பாடாணங்களுள் காணப்படாதிருந்தும், பூரம் மருத்துவர்களால் பாடாண வகைகளுள் ஒன்றாகவே கருதப்படுகிறது.

சுவை - உப்பு, கார்ப்பு

வீரியம்- வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

உடல் தேற்றி

உமிழ் நீர்பெருக்கி

கிருமி நாசினி

குணம்:

இடைவாத சூலை யெரிசூலை குன்மந்
தொடைவாழை வாதமாஞ் சோணி - யிடையாதோ
வொக்குரச கர்ப்பூர மொன்றே யளவொடுநல்
இக்குவெல்லத் தேழுநா ளீ.

நல்ல இரச கர்ப்பூரத்தை அளவுடன் கரும்பு வெல்லத்தில் ஏழுநாள் கொடுக்க, இடுப்பைப் பற்றிய சூலை, ஆங்காங்கு எரிச்சலைத் தருகின்ற சூலை, வாத குன்மம், தொடை வாழை, வாதரத்த நோய் முதலியன.

சுத்தி முறைகள்:

கம்மாறு வெற்றிலை, மிளகு ஆகிய இரண்டையும் கால்பலம்(8.75 கிராம்) வீதம் நிறுத்தெடுத்துச் சிறிது நீர் விட்டு அரைத்து, கல்கத்தை ஒரு படி (1.3 லிட்) நீரில் கலந்து, ஒரு பலம் (35 கிராம்) பூரத்தைச் சீலையில் முடிந்து துலாயந்திரமாய் நீரில் பூரத்தை எடுத்து நீர்விட்டுக் கழுவி வெய்யிலில் உலர்த்தி எடுக்கச் சுத்தியாம்.

இலேகியங்களில் சேர்க்க வேண்டிய பூரத்தை, முசுமுசுக்கைச் சாற்றினால் சுருகிட்டுக் கழுவவும்.

நஞ்சுக் குறிகுணம்:

இது விரைவாக நீரில் கரையாது. இது அதிக அளவில் உடம்பிற்குள் சென்றால் நஞ்சுத் தன்மையைக் காட்டும். அவை யாவன - பல்லீறுகளும், நாவும், வாயும்,

உந்தியும், தாடையின் உட்பக்கமும் புண்ணாகும், வாய் திறக்க முடியாது. நாவில் நீர் சுரக்கும். அந்நீரில் ஒருவகையான் நாற்றத்துடன் நீர்கசியும்.அதையும் விழுங்கமுடியாது. மேலும் முகத்தில் வேர்க்குருவும், பருவுமுண்டாகும் மார்பில் பருக்கட்டி உண்டாகிப் புண்ணாகும், இடுப்பில் வலி உண்டாகும், விரை வீங்கும், உண்ணாக்கு புண்படும். பேதியில் இரத்தம் வரும் ஆகிய குறிகுணங்கள் உண்டாகும்.

முறிவு:

- துளசிச்சாறு அல்லது சிற்றாமணக்கு நெய் அல்லது பாகல் இலைச்சாறு ஆகியவைகளில் ஒன்றைக் கொடுக்க வேண்டிய முறைப்படி 3 அல்லது 5 நாள் அல்லது நஞ்சு தீரும்வரை கொடுக்க வேண்டும்.
- அவுரிவேர்ப்பட்டையை வெந்நீர் விட்டரைத்து ஒரு வேளைக்குச் சுண்டைக்காய் அளவு வீதம் காலையிலும் மாலையிலுமாக நஞ்சு தீரும் வரைக் கொடுத்து வர வேண்டும்[106].

சேரும் மருந்துகள்:

- ஏலாதி மாத்திரை
- பூர மாத்திரை
- அஷ்டபைரவ மாத்திரை
- எமதண்ட குளிகை
- திரிசூத மெழுகு
- வீர மெழுகு[29]
- பஞ்சபாடாண செந்தூரம்[105]

MERCUROUS CHLORIDE

Mercury(I) chloride is the chemical compound with the formula Hg2Cl2. Also known as **calomel** (a mineral form, rarely found in nature) or **mercurous chloride**, this dense white or yellowish-white, odorless solid is the principal example of a mercury (I) compound. It is a component of reference electrodes in electrochemistry. It is found in the nature as horn quick silver. It was medicinally used as purgative, cathartic, liver stimulant, eliminate parasitic worms.

Preparation and Reaction:

Mercurous chloride forms by the reaction of elemental mercury and mercuric chloride:

$$Hg + HgCl2 \rightarrow Hg2Cl2$$

It can be prepared via metathesis reaction involving aqueous mercury(I) nitrate using various chloride sources including NaCl or HCl.

$$2HCl + Hg2(NO3)2 \rightarrow Hg2Cl2 + 2HNO3$$

Ammonia causes Hg2Cl2 to disproportionate:

$$Hg2Cl2 + 2NH3 \rightarrow Hg + Hg(NH2)Cl + NH4Cl$$

Distinguishing characteristics:

The sectile character and the adamantine luster distinguish it from everything expect from the silver halides. Silver metals melt but do not completely on the charcoal leaving a flattened silver residue. In a mercury association ore the fluorescence is significant.

Calomel electrode:

Mercurous chloride is employed extensively in electrochemistry, taking advantage of the ease of its oxidation and reduction reactions. The calomel electrode is a reference electrode, especially in older publications. Over the past 50 years, it has been superseded by the silver/silver chloride (Ag/AgCl) electrode. Although the mercury electrodes have been widely abandoned due to the dangerous nature of mercury, many chemists believe they are still more accurate and are not dangerous as long as they are handled properly. The differences in experimental potentials vary little from literature values. Other electrodes can vary by 70 to 100 millivolts.

Safety consideration:

Mercurous chloride is toxic, although due to its low solubility in water it is generally less dangerous than its mercuric chloride counterpart. It was used in medicine as a diuretic and purgative (laxative) in the United States from the late 1700s (as used by Revolutionary War physician Dr. Benjamin Rush) through the 1860s. Calomel was also a common ingredient in teething powders in Britain up until 1954, causing widespread mercury poisoning in the form of pink disease, which at the time had a mortality rate of 1

in 10. These medicinal uses were later discontinued when the compound's toxicity was discovered.

It has also found uses in cosmetics as soaps and skin lightening creams, but these preparations are now illegal to manufacture or import in many countries including the U.S., Canada, Japan and the European Union. A study of workers involved in the production of these preparations showed that the sodium salt of 2,3-dimercapto-1-propanesulfonic acid (DMPS) was effective in lowering the body burden of mercury and in decreasing the urinary mercury concentration to normal levels.

Health hazard:

Acute poisoning result from inhaling dust concentration of 1.2-8.5mg/m 3 in air. Symptoms include pain and tightness in chest, coughing and difficulty in breathing. Compound is an irritant, cathartic, or purgative. Rarely “calomel sickness“‘‘ a benign reaction with fever and rash appears after about 1 week. Seldom causes systemic poisoning but may be fatal if retained to 30-40 mg/kg. Contact with eyes causes mild irritation.

Mercurous (Hg2++) Mercury:

Mercurous mercury salt in the form of Hg2Cl2 (calomel) is poorly soluble in water and poorly absorbed by the intestine, although some portion is thought to undergo oxidation to more readily absorbable forms. It is doubtful that mercurous mercury survives in the body, other than as a transitional form between metallic and mercuric mercury. Some absorption evidently occurs, however, as calomel is occasionally associated with pink disease, or acrodynia.19

Toxicological aspects of calomel (pooram):

Calomel does not dissolve in water rapidly. If consumed in large quantity, it manifests poisonous effects. 48

Toxic Signs and symptoms:

Ulcerative gingivitis, Ulcerative stomatitis, Ulcerative gastritis, Ptyalism, Pimples and prickly heat, Lumbago, Ulcerative uvlitis, Ulcerative glossitis, Foul smell in the saliva, Dysphagia, Abscess in the chest followed by ulcer, Orchitis, Blood stained diarrhea.20

Anti dote:

Juice of ocimum santum or castor oil from the seeds of the small seeded variety or the leaf juice of momordica charantia is administrated orally for 3 to5 days as specified or till the poisonous effects are neutralized. The root of Indigofera tinctoria is trituated with hot water and given in the size of a solanum pubesens twice daily till the poisonous symptoms disapper[107].

கொப்பரை தேங்காய்

தேங்காய்:

தேங்காயை நன்றாக வெயிலில் காயவைத்து எடுத்துக்கொள்ள கூடிய பருப்பு கொப்பரைத் தேங்காய் எனப்படும்.

செக்கிலிட்டு எண்ணெய் பிழியவும் மற்றும் சித்த மருத்துவத்தில் சில மருந்துகளில் முக்கிய சரக்காகவும் சேருகிறது.

வேறு பெயர்:

திரியஷி, முக்கண்ணன், முடியரசன்.

வழக்கு

- இதைத் துருவிப் பிழிந்த பால் இனிப்பாக இருக்கும். ஆனால் அழலை உண்டாக்கும். இப்பாலைக் காய்ச்சி எண்ணெய் எடுக்கலாம்.
- இப்பாலைக் கொண்டு வாய் கொப்புளித்துவர, வாய்ப்புண், தொண்டைப்புண் முதலியன தீரும்.
- இப்பாலைக் காய்ச்சி, அதில் வரும் என்ணெயை நெருப்புச் சுட்ட புண்களுக்கும் போட்டுவர சீக்கிரம் உலரும், மேற்படி எண்ணெயைத் தலையில் தடவிவர, மயிர்வளரும்.
- தேங்காயிலிருந்து இரண்டு விதங்களில் எண்ணெயை எடுக்கலாம்.
    - உலர்ந்த கொப்பறைத் தேங்காய்
    - தேங்காய்ப்பால்

1. கொப்பறையிலிருந்து ஆட்டி எடுக்கும் என்ணெயை, கறிபதார்த்தங்கள் தாளிப்பதற்க்கும், தலையில் தேய்துதுக் கொள்வதற்கும் மலையாள தேசத்தார் அதிகமாய் கையாண்டு வருகிறார்கள்.
2. தேங்காயைத் துருவ்ப் பிழிந்த பாலைக் காய்ச்சி எடுக்கும் எண்ணெயை,தலைக்கும், கறிக்கும் பயன்ப்படுத்துவதுண்டு. தலை மயிர் நன்றாக வளரும். அன்றியும், புண்களுக்கு காய்சச்சும் எண்ணெய்களில் இது சிறப்பாகச் சேரும்.

தேங்காய்ப்பால்:

வாதமாம் பித்தமுறும் வன்கரப்ப னும்படருந்

தாதுமிகவிருத்தியாந் தாழ்குழலே-போதநல்ல

அன்ன மிறங்கு மதியுருசியுண்டாகுந்

தென்னங்காய்ப் பாலாற் றெளி.

தேங்காயெண்ணெய்:

இலாங்கலி யெண்ணெயு மெண்ணெையைப் போன்றே

பொலாங்கு செய்திடம் போற்ற லோண்ணாதே[7].

இது நல்லெண்ணெையை போலவே நன்மையுடையது.சமயலுக்கும் பயன்ப்படுகிறது. சில வெளிப்பிரோயமாக பயன்ப்படும் எண்ணெய் மற்றும் சில களிம்புகளில் முக்கிய பொருளாகவும் சேருகிறது.

சேரும் மருந்துகள்:

- மகாமேக வல்லாதகி
- சல வல்லாதகி
- கலி வல்லாதகி

MATERIALS AND METHODS

PREPARATION OF THE TEST DRUG

COLLECTION:

Cherankottai (Semicarpus anacardium), Ell (Sesamum indicum), Chithira moolaverpattai (Plumbago indica), Kasthoori manjal (Curcuma aromatica), Karunjchiragam (Nigella sativa), kurosani Omam (Hyoscyamus niger), Kadukkai thol (Terminalia chebula), Valuzhuvai (Celastrus paniculatus), Vettrilai kambu (Piper bettle), Thippli (Piper longum), Koshtam (Saussrea lappa), Kopparai Thengai (Kernel of coconut), palm jaggery and Rasakarpooram (Hydragyrum subchloride) were collected from reputed raw drug shop, Chennai. Vettrilaikambu (Piper bettle) were collected from Vegetable market Tambaram, Chennai.

AUTHENTICATION:

The Herbal drugs Cherankottai (Semicarpus anacardium), Ell (Sesamum indicum), Chithira moolaverpattai (Plumbago indica), Kasthoorimanjal (Curcuma aromatica), Karunjchiragam (Nigella sativa), Kurosani Omam (Hyoscyamus niger), Kadukkai thol (Terminalia chebula), Valuzhuvai (Celastrus paniculatus), Vettrilai kambu (Piper bettle), Thippli (Piper longum), Koshtam (Saussrea lappa), Kopparai Thengai (Kernel of coconut), palm jaggery and Vettrilaikambu (Piper bettle) were identified and authenticated by Assistant Professor, Department of Medicinal Botany, National Institute of Siddha, Chennai-47.

The Mineral drug Rasakarpooram (Hydragyrum subchloride) were identified and authenticated by Research officer (Chemistry), Siddha Central Research Institute, Arumbakkam, Chennai-106.

PURIFICATION:

Kurosani Omam:

Wipe the drug with clean cloth remove fine dust particle and dry it.

Kasthoori Manjal:

Peel the outer layer and cut in to small pieces and dry it in shade.

Koshtam:

Check for unwanted particles and dry it in shade.

Valuzhuvai:

Wash in aloe vera juice and dry it in shade.

Chithiramoolam:

Remove central vein and collect the outer layer and powder it. Then spread it on a white cloth tied to the wide mouthed vessel containing milk, close the vessel with a lid and boil it for three hours finally collect the powder and dry it in shade.

Karunjchirakam:

Remove the waste material, dry it shade and fry, it becames golden brown in colour.

Thippili:

Soak it in lemon juice and dry it

Parankippattai:

Powder the bark and boil it with milk and dry it.

Amukkara:

Boil it with milk and dry it.

Rasakarpooram:

Take kammaru vetrilai and pepper each 8.75gm grinded with small amount of water, make it into a karkam and mix with 1.3 liter of water. Take 35gm of Rasakarpooram tied in a white cloth and dip in the prepared water with the help of thulaenthiram. Fire with small amount of heat till the prepared water getting dry upto 75%. Atlast take the Rasakarpooram from the thulaenthiram, wash with water and dry it in sunlight.

4.1 PREPRATION OF IDIVALLATHI MEZHGU:

Ingredients :-

Cherangottai
Ell — 10 palam(350gm)

Rasa Karpooram -- 1/2 palam(17.5gm)

Palm Jaggery -- 5 palam(175gm)

Kopparai Thengai -- 2 nos

Parankipattai, Amukkara
Chithira moolaverpattai
Kasthoori Manjal
Karunjchiragam
Valuzhuvai
Kurosani Omam, Kadukkai Thol
Vettrilai kambu, Thippili, Koshtam — Each 1 palam(35gm)

Carefully cut the semicarpus anacardium nuts into pieces avoiding contact with the exudation oil and soak the pieces in cow dung solution for three days and wash with water and with tender coconut water and dry. Take 416 grams of the purified nut pieces along with 83.2 grams of sesame seeds and 83.2 grams of dry copra and pound them in a stone mortar with the pestle having a wooded tip. Add 41.6 grams each of the powder of Smilax china, Withania somnifera, Plumbago zeylanica, Curcuma aromatic, Nigella sativa, Celastrus paniculatus, Hyoscyamus niger, twig of piper bettle, Terminalia chebula, Piper longum, Saussurea lappa and 20.8 grams of calomel and pound to fineness. Add 208 grams of palm jaggery and pound again to obtain a waxy consistency. Store the medicine for three months before using.

Dosage -- Sundai alavu(0.798gm)

Indication --Soolai**,** Kushtam, kiranthi, araiyappu, envgaigunmam, megam, sukkilavayu, ranamegam.

Duration -- 1 Mandalam(48 days)

STANDARDIZATION OF IDIVALLATHI MEZHUGU

4.2 QUALITATIVE ANALYSIS

PHYSICO-CHEMICAL ANALYSIS OF IDIVALLATHI MEZHUGU

The physico- chemical properties of Idivallathi mezhugu is carried as per standard procedure at The Tamilnadu Dr.M.G.R.Medical University, Guindy, Chennai

1.Moisture Content:

An accurately weighed 1g of ***Idivallathi mezhugu*** formulation was taken in a tarred glass bottle. The crude drug was heated at 105^0C in an oven till a constant weight. Percentage moisture content of the sample was calculated with reference to the shade dried material.

2.Determination of total ash:

Weighed accurately 1g of ***Idivallathi mezhugu*** formulation was added in crucible at a temperature 600^0C in a muffle furnace till carbon free ash was obtained. It was calculated with reference to the air dried drug.

3.Determination of acid insoluble ash:

Ash above obtained, was boiled for 5min with 25ml of 1M Hydrochloric acid and filtered using an ash less filter paper. Insoluble matter retained on filter paper was washed with hot water and filter paper was burnt to a constant weight in a muffler furnace. The percentage of acid insoluble as was calculated with reference to the air dried drug.

4.Determination of water soluble ash:

Total ash 1g was boiled for 5min with 25ml water and insoluble matter collected on an ash less filter paper was washed with hot water and ignited for 15min at a temperature not exceeding 450^0C in a muffle furnace. Difference in weight of ash and weight of water.

5.Determination of water soluble Extractive:

1gm of air dried drug, coarsely powered ***Idivallathi mezhugu*** was macerated with 100ml of distilled water in a closed flask for twenty-four hours shaking frequently. Solution was filtered and 25 ml of filtrated was evaporated in a tarred flat bottom shallow dish, further dried at 100^0 C and weighted. The percentage of water soluble extractive was calculated with reference to the air dried drugs.

6. Determination of alcohol soluble extractive:

1 gm. of air dried drugs, coarsely powdered ***Idivallathi mezhugu*** was macerated with 100 ml. alcohol in closed flask for 24 hrs. With frequent shaking. It was filtered rapidly taking precaution against loss of alcohol. 25ml of filtrate was then evaporated in a tarred flat bottom shallow dish, dried at 100^0C and weighted. The percentage of alcohol soluble extractive was calculated with reference to air dried drug.

THE PRELIMINARY PHYTOCHEMICAL SCREENING TEST

The preliminary phytochemical screening test was carried out for each extracts of ***Idivallathi mezhugu*** as per the standard procedure at The Tamilnadu DR.M.G.R. Medical University, Guindy, Chennai-32.

Detection of alkaloids

Extracts were dissolved individually in diluted hydrochloric acid and filtered.

Mayer's test

2 ml of extract was treated with few drops of Mayers' reagent, formation of yellow coloured precipitate indicates the presence of alkaloids.

Wagner's test

2 ml of filtrate was treated with Wagner's reagent. Formation of brown /reddish precipitate indicates the presence of alkaloids.

Detection of carbohydrate

Extract was dissolved individually in 5 ml distilled water and filtered. The filtrates were used to test for presence of carbohydrates.

Molisch's test:

2 ml of filtrate was treated with few drops of alcoholic Alpha naphthol solution in a test tube. Formation of the violet ring at the junction indicates presence of carbohydrates.

Benedict's test:

Filtrate was treated with Benedict's reagent and heated gently. Orange red precipitate indicates the presence of reducing sugars.

Detection of saponins

Froth test

Extracts was diluted with distilled water to 20 ml and this was shaken in a graduated cylinder for 15 minutes. Formation of 1 centimeter layer of foam indicates the presence of Saponins.

Foam test

0.5-gram extract was shaken with 2 ml of water. If foam produced persists for 10 minutes, it indicates the presence of saponins.

Detection of phytosterols

Salkowski's test

Extracts was treated with chloroform and filtered; the filtrates were treated with few drops of concentrated sulphuric acid, shaken and allowed to stand for few minutes. Golden yellow colour indicates the presence of triterpenes.

Detection of phenols

Ferric Chloride test: 2 ml of extracts was treated with 3-4 drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenols.

Detection of tannins

Gelatin test

To the extracts, 1% of gelatin solution containing sodium chloride was added, formation of white precipitate indicates the presence of tannins.

Detection of flavonoids

Alkaline reagent test

Extract was treated with few drops of 10% sodium hydroxide, formation of intense yellow colour then on addition of diluted hydrochloric acid it becomes colourless, it indicates the presents of flavonoids.

Lead acetate test

Extract was treated with few drops of lead acetate solution, yellow colour precipitate indicates presence of flavonoids.

Detection of diterpenes

Copper Acetate test

Extracts were dissolved in water and treated with 3-4 drops of copper Acetate solution, formation of emerald green colour indicates the presence of diterpenes.

Test for gum and mucilage

The extract was dissolved in 10 ml of distilled water and to this 2ml of absolute alcohol with the constant stirring white cloudy precipitate indicates the presence of gum and mucilage.

Detection of Glycosides

Liebermann's test

2ml of extract was treated with 2ml chloroform and 2ml of acetic acid, Violet colour change into blue and green indicates presence of Glycosides.

Test for Quinones

Extract was treated with sodium hydroxide blue or red precipitate indicates the presence of Quinones.

Result

The Preliminary phytochemical studies of extract of ***Idivallathi mezhugu*** in various solvents were done using standard procedures. The results were presented in tables. The present study reveals that the bioactive compounds were present in all the extracts of ***Idivallathi mezhugu***.

BIO-CHEMICAL ANALYSIS:

The bio-chemical analysis of Idivallathi mezhugu as done at Biochemistry lab National Institute of Siddha, Chennai-47.

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1.	**Appearance of sample**	Black in colour	
2.	**Test for Silicate:** a. A little (500mg) of the sample is shaken well with distilled water. b. A little(500mg) of the sample is shaken well with con. HCl/Con. H_2So_4	Not soluble	Absence of Silicate
3.	**Action of Heat:** A small amount (500mg) of the sample is taken in a dry test tube and heated gently at first and then strong	White fumes not evolved	Absence of Carbonate
4.	**Flame Test:** A small amount (500mg) of the sample is made into a paste with con. HCl in a watch glass and introduced into non-luminous part of the Bunsen flame	No bluish green flame appeared.	Absence of Copper
5.	**Ash Test:** A filter paper is soaked into a mixture of sample and dil. cobalt nitrate solution and introduced into the Bunsen flame and ignited	Yellow colour flame appeared	Presence of Sodium

Preparation of Extract:

5gm of ***Idivallathi mezhugu(IVM)*** is weighed accurately and placed in a 250ml clean beaker and added with 50ml of distilled water. Then it is boiled well for about 10 minutes. Then it is cooled and filtered in a 100ml volumetric flask and made up to 100ml with distilled water.

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
I.Test For Acid Radicals			
1.	**Test For Sulphate:** 2ml of the above prepared extract is taken in a test tube to this added 2ml of 4% dil ammonium oxalate solution	Cloudy appearance present	Presence of Sulphate
2.	**Test For Chloride:** 2ml of the above prepared extracts is added with 2ml of dil-HCl is added until the effervescence ceases off...	Cloudy appearance present	Presence of Chloride
3.	**Test For Phosphate:** 2ml of the extract is treated with 2ml of dil. ammonium molybdate solution and 2ml of con.HNO	No yellow precipitate present	Absence of Phosphate
4.	**Test For Carbonate:** 2ml of the extract is treated with 2ml dil.magnesium sulphate solution	Presence of cloud appearance	Presence of carbonate
5.	**Test For Nitrate:** 1gm of the substance is heated with copper turning and concentrated H2SO4 and viewed the test tube vertically down	No brown gas is evolved	Absence of Nitrate
6.	**Test For Sulphide:** 1gm of the substance is treated with 2ml of con. HCL	No rotten Egg Smelling gas is evolved	Absence of Sulphide
7.	**Test For Fluoride & Oxalate:** 2ml of extract is added with 2ml of dil. Acetic acid and 2ml dil. calcium chloride solution and heated**.**	Absence of Cloudy appearance	Absence of fluoride and oxalate
8.	**Test For Nitrite:** 3drops of the extract is placed on a filter paper, on that-2 drops of dil. acetic acid and 2 drops of dil. Benzidine solution is placed.	No characteristic changes	Absence of Nitrite
9.	**Test For Borate:** 2 Pinches (50mg) of the substance is made into paste by using dil. Sulphuric acid and alcohol(95%) and introduced into the blue flame.	No bluish green colour flame appeared	Absence of borate

II. Test for Basic Radicals			
1.	**Test For Lead:** 2ml of the extract is added with 2ml of dil. Potassium iodine solution.	No yellow Precipitate is obtained.	Absence of Lead
2.	**Test For Copper:** **a.** One pinch (50mg) of substance is made into paste with con. HCl in a watch glass and introduced into the non-luminous part of the flame.	No blue colour precipitate is formed.	Absence of copper
3.	**Test For Aluminum:** To the 2ml of extract dil. sodium hydroxide is added in 5 drops to excess	No yellow colour Appearance	Absence of aluminum
4.	**Test For Iron:** A. To the 2ml of extract add 2ml of dil. Ammonium solution B. To the 2ml of extract 2ml thiocyanate solution and 2ml of con HNo3 is added	Brown precipitate is formed Red colour appearance	Iron present
5.	**Test For Zinc:** To 2ml of the extract dil .sodium hydroxide solution is added in 5 drops to excess and dil. ammonium chloride is added.	No white precipitate is formed	Absence of Zinc
6.	**Test For Calcium:** 2ml of the extract is added with 2ml of 4% dil. ammonium oxalate solution	No Cloudy appearance or white precipitate formation is present	Absence of calcium

7.	**Test For Magnesium:** To 2ml of extract dil. Sodium hydroxide solution is added in drops to excess	No white precipitate is obtained	Absence of Magnesium
8.	**Test For Ammonium:** To 2ml of extract 1 ml of Nessler's reagent and excess of dil. Sodium hydroxide solution are added.	No brown colour is appeared	Absence of ammonium
9.	**Test For Potassium:** A pinch (25mg) of substance is treated off with 2ml of dil. Sodium nitrite solution an then treated with 2ml of dil. Cobalt nitrate in 30% dil. Glacial acetic acid.	No yellowish precipitate is obtained.	Absence of Potassium
10.	**Test For Sodium**: 2 pinches (50mg) of the substance is made into paste by using HCl and introduced into the blue flame of Bunsen burner	No yellow colour flame appeared	Absence of sodium
11.	**Test For Mercury**: 2ml of the extract is treated with 2ml of dil. sodium hydroxide solution.	Yellow precipitate is obtained	Presence of mercury
12.	**Test For Arsenic:** 2ml of the extract is treated with 2ml of dil .sodium hydroxide solution	No brownish red precipitate is obtained	Absence of arsenic

Other constituents			
1.	**Test For Starch :** 2ml of extract is treated with weak dil. iodine solution	Blue colour Formation is present	Presence of starch
2.	**Test For Reducing Sugar:** 5ml of Benedict's qualitative solution is taken in a test tube and allowed to boil for 2 minutes and added 8 to 10 drops of the extract and again boil it for 2 minutes. The colour changes are noted.	Brick red colour developed	Presence of reducing sugar
3.	**Test For The Alkaloids**: a) 2ml of the extract is treated with 2ml of dil. Potassium iodide solution. b) 2ml of the extract is treated with 2ml of dil. Picric acid	Yellow precipitation appears	Presence of Alkaloid
4.	**Test For Tannic Acid:** 2ml of extract is treated with 2ml of dil. Ferric chloride solution	No Black precipitate is obtained	Absence of Tannic acid
5.	**Test For Unsaturated Compound:** To the 2ml of extract 2ml of dil. Potassium permanganate solution is added.	Potassium permanganate is not decolourised	Absence of unsaturated compound
6.	**Test For Amino Acid:** 2 drops of the extract is placed on a filter paper and dried well. 20ml of Biurette reagent is added**.**	Violet colour is not developed	Absence of amino acids
7.	**Test For Type Of Compound:** 2ml of the extract is treated with 2 ml of dil .ferric chloride solution.	Red colour developed	Anti pyrine, Aliphatic amino acids and meconic acid are present

4.3 QUANTITATIVE ANALYSIS

The Microbial load Aflatoxin and pesticide analysis were done in Bureau Veritas Consumer Products Services Pvt. Ltd, Ekkattuthangal, Chennai – 32.

Determination of Microbial Load

The determination of microbial load as described below was carried out on sample Idivallathi mezhugu as per the Who guidelines (Anonymous 1998).

Pre-treatment of the test material:

Depending on the nature of the crude herbal material grind, dissolve, dilute, suspend or emulsify it using a suitable method and eliminate any antimicrobial properties by dilution, neutralization or filtration. Either phosphate buffer pH 7.2, buffered sodium chloride-peptone solution, pH 7.0 or fluid medium, used to suspend or dilute the test specimen. Test procedure for the Enterobacteriaceae and certain other Gram-negative bacteria.

Detection of Bacteria

Homogenise the pre-treated material appropriately and incubate at 30-37^0 C for a length of time sufficient for multiplication of the organisms. Shake the container, transfer aliquots equivalent to 1gm or 1ml of the homogenized material to 100ml Enterobacteriae enrichment booth Mossel and incubate at 35 – 37^{0}C for 18-48 hours. Prepare a subculture on a plate with violet-red bile agar with glucose and lactose. Incubate at 35-37^{0}C for 18-48 hours. The material passes the test if no growth of colonies of Gram-negative bacteria is detected on the plate.

Test Procedure:

Plate Count:

For bacteria use Petri dishes 9-10 cm in diameter. To one dish add a mixture of 1 ml of the pre-treated herbal material and about 15ml of liquefied casein-soybean digest agar at a temperature not exceeding 45^{0}C. Alternatively, spread the material on the surface of the solidified medium in a Petri dish. If necessary, dilute the material to obtain an expected colony count of not more than 300. Prepare two dishes using the same dilution, invert them and incubate them at 30-35^{0}Cfor 48-72 hours, unless a reliable count is obtained in a short period of time. Count the number of colonies formed and calculates the result using the plate with the largest number of colonies, up to a maximum of 300. For fungi use Petri dishes 9-10 cm in diameter. To one dish add a mixture 1ml of pre-treated material and about 15ml of liquefied sabouraud glucose agar

with antibiotics at a temperature not exceeding 45^0c. Alternatively, spread the pre-treated material as described above to obtain an expected colony count of not more than 100. Prepare at least two distinguishing the same dilution and incubate them upright at 20-25^0Cfor 5 days, unless a more reliable count is obtained in a shorter period of time. Count the number of colonies formed and calculates the results using the dish with not more than 100 colonies

2. Test for Aflatoxins

Aflatoxin level in sample Idivallathi mezhugu was measured by AOAC 2008.02. Test portion is extracted with methanol water mixture(70% methanol). Then the extract is centrifuged, dilute with phosphate buffer and immune affinity column containing antibodies specific for Aflatoxins was applied. The toxin was eluted from the column with methanol and quantified by GCMS using post column derivitization with kobra cell.

2. **Estimation of pesticide residue**

Pesticide value of sample 1 was estimated by means of AOAC 2007.01 by GC MS MS/LC MS MS . Pesticides are usually used in agriculture to increase the yield, Improve the quality and to extent the storage life of food crops. These are the deposits of pesticide active ingredients, its metabolites or break down products present in same component of environment after its application, spillage or dumping. residue analysis gives the nature and level of chemical contamination with the environment and of its persistence.

Sample preparation

The acetate buffered Quechers sample preparation method was applied. After homogenization with a house hold mill a15gm portion of the homogenized sample was weighed into a 50 ml polytetrafluro ethylene tube (PTFE) and 100ml of surrogate standard solution in aceto nitrile was added followed by 15 ml of aceto nitrile containing 1% acetic acid. Then 6gm of MgSO4 and 2.5 gm sodium acetate trihydrate were added. Then centrifuge the sample at 4000rpm. Then transferred the supernatant and filtered with PTFE filter. Then sample was transferred to auto sample vials and the extracts were evaporated to dryness under a steam of Argon. The analysis done by gas

chromatography. liquid chromatography coupled to tandem mass spectroscopy with triple quadruple mass analysers GC MS MS/LC MS.

HEAVY METAL ANALYSIS:

The analysis of heavy metals was estimated by using Atomic Absorption Spectrophotometer (AAS) Experimental Procedure was done at Asthagiri Herbal Research Foundation, Chennai – 96.

INSTRUMENT DETAILS:

Method of Analysis – AAS, UV – V is spectrometer

Instrument/ Model – AA240 series, UV 8500

Wavelength: Hg – 253.7nm

As – 193.7 nm

Cd – 228.8 nm

Cu – 324.8 nm

Pb – 500nm

4.4 TOXICOLOGICAL EVALUATION OF IDIVALLATHI MEZHUGU (IVM):

The following in vivo toxicity studies were carried out on Idivallathi mezhugu (IVM) by World Health Organization (WHO) guidelines.

Acute Oral Toxicity study (WHO)

90 Days Long term toxicity study (WHO)

The toxicity studies were carried out at National Institute of Siddha. The study was done after getting permission from the Institutional Animal Ethical Committee.

IAEC Approved No:

For acute toxicity study – NIS/IAEC-I/2016/10

For long term toxicity study – NIS/IAEC-II/07/2016

For Acute toxicity study test animals were obtained from Tamil Nadu Veterinary and Animal Sciences University, Madhavaram. And for Long term toxicity study test animals are obtained from Biogen laboratory Animal Facility, Bangalore. Animals are kept at animal house, National Institute of Siddha, Chennai.

DESCRIPTION OF THE METHOD

Selection of the animals:

Animals were selected as per guidelines. Healthy adult animals of Wistar albino rat, both male and female sex were used for acute oral toxicity study. Healthy adult animals of Wistar albino rat, both sex were used for 90 Days Long term toxicity study. The female animals used in the studies were nulliparous and non-pregnant.

Housing and feeding conditions:

The temperature in the experimental animal room : 22ºC (± 3ºC).

Humidity: 60 ± 10 %

Lighting : Artificial, the sequence being 12 hours light, 12 hours dark.

The animals were housed in polypropylene cages provided with bedding of husk.

The animals had free access to RO water.

For feeding, Standard pellet diet (bought from SaiMeera foods pvt. Ltd, Bangalore) was used.

Preparation of animals:

The animals are randomly selected, to permit individual identification by cage number and individual marking on the fur of each animals was made with picric acid. The animals were kept in their cages for 7 days prior to dosing to allow for acclimatization to the laboratory conditions. The principles of laboratory animal care were followed.

Test Substance:

***Idivallathi mezhugu (IVM*)** is black in colour, without taste and odor. To obtain and ensure the uniformity in drug distribution; the drug is dissolved in propylene glycol and distilled water.

Route of administration:

Oral route was selected, because it is the normal route of clinical administration.

Preparation of doses:

The stock solution was prepared freshly as dose per animal suspended in 1ml of Propylene glycol with distilled water.

PROCEDURE:

ACUTE ORAL TOXICITY STUDY

Test animals:

Species and strain	: Wistar Albino rat
Sex	: Female
Age, Weight	: 6 weeks, 150-175 gm
Test guideline	: WHO guideline
Groups/treatment	: Grouped by randomization
Duration of exposure to the "Idivallathi mezhugu(IVM)"	: Single dose
Study duration	: 14 days
Number of animals	: 3male, 6female
Route of administration	: Oral

Number of animals and dose levels:

Animals are divided into two groups, each group containing 5 male and 5 female rats. One group as control and the other as test group. Control group is treated with propylene glycol and other groups were treated with test drug Idivallathi mezhugu (IVM) ten times the therapeutic dose (720mg per kg b.wt)

Groups	No. of Rats
Group I Vehicle control (Propylene Glycol)	3 female
Group II Test drug -10 times the therapeutic dose (720mg per kg b.wt)	3 female, 3 male

Administration of doses:

The test drug was administered in a single dose by using oral gavage. Animals were fasted prior to drug administration. Following the period of fasting, the animals were weighed and test drug was administered. The control groups received equal volume

of the Propylene Glycol. The test drug was administered at 10 times the therapeutic dose (720 mg per kg b.wt). The food was withheld for 3-4 hours after dosing the animal.

Observations:

Animals were observed individually after dosing once during the first 30 minutes, periodically during the first 24 hours, with special attention given during the first 4 hours, and daily thereafter, for a total of 14 days.

Animals were observed for mortality and signs of tremors, convulsions, salivation, diarrhea and coma. Accessibility of food and water, Changes in skin and fur, eyes and mucous membranes, sleep pattern, locomotion were noted.

- **Body weight:**

  Body weight of individual animals was noted shortly before the drug is administered and weekly once thereafter.

- **Gross necropsy:**

  At the end of the experiment, all animals were sacrificed and subjected to necropsy.

LONG TERM TOXICITY STUDY

Test animals:

Species and strain	: Wistar albino rats
Sex	: Male and Female
Age, Weight	: 6 weeks, 150-175 mg
Test guideline	: WHO guidelines
Groups/treatment	: Grouped by randomization
Duration	: 90 days
Number of animals	: 12/group (6/sex)
Route of administration	: Oral

Grouping of animals:

90 days long term toxicity study was carried out at different dose levels. The animals in both sex were divided in four groups (group I,II, III & IV). Each group consist of 12 animals (6 males and 6 females). Group-I served as control and the other three groups II, III and IV for test drug of Low dose (X=72mg/kg b.wt), Mid dose

(5X=360mg/kg b.wt) and High dose(10X=720mg/kg b.wt) respectively[The low dose was calculated from the therapeutic dose (0.8g) and body surface area of rat (0.018). Calculation of low dose – 800 × 0.018 = 14.4 mg/200 gm of animal]

Groups	No of Rats
Group I Vehicle control (Propylene Glycol)	12 (6male, 6female)
Group II test drug - low dose X (72 mg/kg b.wt)	12 (6male, 6female)
Group III test drug - Mid dose 5X (360 mg/kg b.wt)	12 (6male,6female)
Group IV test drug - High dose 10X (720 mg/kg b.wt)	12 (6male,6female)

Administration of doses:

The animals were dosed with the test drug daily for a period of 90 days. The test drug were administered by oral gavage, and this was done in a single dose to the animals once in daily for 90 days.

Observations:

Animals were noted twice daily for morbidity and mortality during the experimental period.

- **Body weight and food/water consumption**

During the study period, Body weight of all animals and food, water consumption per day were calculated weekly once.

- **Blood collection and Laboratory investigations**

At the end of 90 days, blood samples were collected just prior to euthanasia in all overnight (12 hours) fasted rats through abdominal aorta and it was processed for below mentioned investigations.

Complete Blood Count

Renal function test

Liver function test

Lipid profile

- **Necropsy**

By the end of 90 days, after blood collection the animals were sacrificed by excessive anesthesia. Animals were subjected to gross necropsy. Organs like heart, lungs, kidney, liver, spleen, stomach, ovary testis and brain were collected from all animals and preserved in 10% buffered neutral formalin.

- **Histopathology**

Preserved organs were sliced 5 or 6μm sections and it will be stained with hematoxylin and eosin, examined for histopathological changes.

STATISTICAL ANALYSIS:

Findings such as clinical sings of intoxication, body weight changes, food consumption, hematology, and biochemical parameters were subjected to one-way ANOVA followed by Dunnet "t" test using a computer software programme-Graphad INSTAT-V3.1.

RESULT

Table 1: Physico-chemical properties of Idivallathi mezhugu(IVM)

S.No	Parameters	Percentage
1	Moisture content	5.86678%
2	Total ash value	3.892%
3	Acid insoluble ash	<1% (0.7%)
4	Water soluble ash	1.3%
5	Water soluble extraction	16%
6	Alcohol soluble extraction	51.32%

Table 2: Colour and nature of Idivallathi mezhugu(IVM)

S No	Parameters	Results
1	Appearance	Dark brown coloured semisolid substance
2	pH at 25°C(1%w/v solution)	3.65
3	Solubility(NS)	Partially soluble in water Partially soluble in acid Dispersed in alcohol

Table 3: Biochemical analysis of Idivallathi Mezhugu

S.NO	PROCEDURES	RESULTS
1	Test for Ammonium	-
2	Test for Sodium	+
3	Test for Magnesium	-
4	Test for Aluminum	-
5	Test for Potassium	+
6	Test for Calcium	+
7	Test for Ferrous Iron	+
8	Test for Zinc	-
9	Test for Arsenic	-
10	Test for Mercury	+
11	Test for Lead	-
12	Test for Sulphate	+
13	Test for Chloride	+
14	Test for Phosphate	-
15	Test for Carbonate	+
16	Test for Fluoride & Oxalate	-
17	Test for Starch	+
18	Test for Reducing sugar	+
19	Test for Alkaloids	+
20	Test for Amino Acids	-
21	Test for Unsaturated compounds	+

(+) – present ; (-) - Absent

Table 4: Phytochemical Analysis for Idivallathi mezhugu

S.No	Phyto chemicals	Test Name	H_2O ext.
1	Alkaloids	Mayer's test	+ve
		Wagner's test	+ve
2	Carbohydrates	Molisch's test	-ve
		Benedict’s test	+ve
3	Glycosides	Libermann Burchard's test	+ve
4	Saponins	Froth test	-ve
		Foam test	-ve
5	Phytosterols	Salkowski's test	-ve
6	Phenols	Ferric chloride test	-ve
7	Tannins	Gelatin test	-ve
8	Flavonoids	Alkaline Reagent test	+ve
		Lead acetate test	+ve
9	Proteins and Amino acids	Xanthoproteic test	-ve
10	Diterpenes	Copper acetate test	+ve
11	Gum & mucilage	Extract + alcohol	-ve
12	Quinone	NAOH + Extract	+ve

Table 5. Aflatoxin for Idivallathi Mezhugu

S. No	Test Parameters	Units of Measurement	Result
Aflatoxin			
1	Aflatoxin B1	µg/kg	BLQ (LOQ – 0.5)
2	Aflatoxin B2	µg/kg	BLQ (LOQ – 0.5)
3	Aflatoxin G1	µg/kg	BLQ (LOQ – 0.5)
4	AflatoxinG2	µg/kg	BLQ (LOQ – 0.5)

Table 6: Pesticide residue for Idivallathi mezhugu

S. No	Test Parameters	Units of Measurement	Result
PESTICIDE RESIDUES			
1	Aldrin (Aldrin and dieldrin combined expressed as dieldrin)	mg/kg	BLQ (LOQ – 0.01)
2	Dieldrin (see Aldrin)	mg/kg	BLQ (LOQ – 0.01)
3	Chlordane (cis & trans)	mg/kg	BLQ (LOQ – 0.01)
4	Chlorothalonil	mg/kg	BLQ (LOQ – 0.01)
5	DDT (all isomers, Sum of p, p'-DDT, o, p' – DDT, p, p'- DDE and p, p' – TDE (DDD) expressed as DDT	mg/kg	BLQ (LOQ – 0.01)
6	Dicofol	mg/kg	BLQ (LOQ – 0.01)
7	Endosulphan (All isomers)	mg/kg	BLQ (LOQ – 0.01)
8	Endrin	mg/kg	BLQ (LOQ – 0.01)
9	HCH (alpha & beta)	mg/kg	BLQ (LOQ – 0.01)
10	Heptachlor (sum of heptachlor and heptachlor epoxide expressed as heptachlor)	mg/kg	BLQ (LOQ – 0.01)
11	Linade (gamma – HCH)	mg/kg	BLQ (LOQ – 0.01)
12	4- bromo – 2 – Cholrophenol	mg/kg	BLQ (LOQ – 0.01)
13	Acephate	mg/kg	BLQ (LOQ – 0.01)
14	Chlorfenvinphos	mg/kg	BLQ (LOQ – 0.01)
15	Chlorpyrifos	mg/kg	BLQ (LOQ – 0.01)
16	Chlorpyriphos – methyl	mg/kg	BLQ (LOQ – 0.01)
17	Diazinon	mg/kg	BLQ (LOQ – 0.01)
18	Dichlorvos	mg/kg	BLQ (LOQ – 0.01)
19	Dimethoate (Including Omethoate)	mg/kg	BLQ (LOQ – 0.01)
20	Omethoate (refer to Dimethoate)	mg/kg	BLQ (LOQ – 0.01)
21	Ethion	mg/kg	BLQ (LOQ – 0.01)
22	Etrimphos	mg/kg	BLQ (LOQ – 0.01)

23	Fenitrothion	mg/kg	BLQ (LOQ – 0.01)
24	Edifenphos	mg/kg	BLQ (LOQ – 0.01)
25	Fenthion	mg/kg	BLQ (LOQ – 0.01)
26	Iprobenphos	mg/kg	BLQ (LOQ – 0.01)
27	Malathion (sum of malathion and malaoxon expressed as malathion)	mg/kg	BLQ (LOQ – 0.01)
28	Methamidophos	mg/kg	BLQ (LOQ – 0.01)
29	Monocrotophos	mg/kg	BLQ (LOQ – 0.01)
30	Oxydemeton – methyl (sum of oxydemeton methyl and demeton – S- methylsulfone expressed as oxydemeton methyl)	mg/kg	BLQ (LOQ – 0.01)
31	Parathion ethyl	mg/kg	BLQ (LOQ – 0.01)
32	Parathion – methyl (sum of parathion methyl and paraoxon methyl expressed as parathion methyl)	mg/kg	BLQ (LOQ – 0.01)
33	Phenthoate	mg/kg	BLQ (LOQ – 0.01)
34	Phorate (sum of phorate, its oxygen analogue and their sulfones expressed as phorate)	mg/kg	BLQ (LOQ – 0.01)
35	Phosalone	mg/kg	BLQ (LOQ – 0.01)
36	Phosphamidon	mg/kg	BLQ (LOQ – 0.01)
37	Profenophos	mg/kg	BLQ (LOQ – 0.01)
38	Primiphos – methyl	mg/kg	BLQ (LOQ – 0.01)
39	Propetamphos	mg/kg	BLQ (LOQ – 0.01)
40	Quinalphos	mg/kg	BLQ (LOQ – 0.01)
41	Temephos	mg/kg	BLQ (LOQ – 0.01)
42	Thiometon	mg/kg	BLQ (LOQ – 0.01)
43	Triazophos	mg/kg	BLQ (LOQ – 0.01)
44	Allerthrin and Bioallethrin	mg/kg	BLQ (LOQ – 0.01)
45	Bifethrin	mg/kg	BLQ (LOQ – 0.01)
46	Cyfluthrin (Including other mixture of constituent isomers sump of isomers)	mg/kg	BLQ (LOQ – 0.01)
47	Cypermethrin (Including other mixtures of constituent isomers sump of isomers)	mg/kg	BLQ (LOQ – 0.01)
48	Deltamethrin	mg/kg	BLQ (LOQ – 0.01)
49	Ethofenprox (Etofenprox)	mg/kg	BLQ (LOQ – 0.01)
50	Fenpropathrin	mg/kg	BLQ (LOQ – 0.01)
51	Fenvalerate & Esfenvaleratre (sum of RR & SS isomers)	mg/kg	BLQ (LOQ – 0.01)
52	Fenvalerate & Esfenvalerate (sum of RS & SR isomers)	mg/kg	BLQ (LOQ – 0.01)
53	Lambda – cyhlothrin	mg/kg	BLQ (LOQ – 0.01)
54	Permethrin (sum of isomers)	mg/kg	BLQ (LOQ – 0.01)
55	Tau – Fluvalinate	mg/kg	BLQ (LOQ – 0.01)
56	Transfluthrin	mg/kg	BLQ (LOQ – 0.01)

57	Bendiocarb	mg/kg	BLQ (LOQ – 0.01)
58	Benfuracard	mg/kg	BLQ (LOQ – 0.01)
59	Benomyl (see carbendazim)	mg/kg	BLQ (LOQ – 0.01)
60	Carbaryl	mg/kg	BLQ (LOQ – 0.01)
61	Carbofuran (sum of carbofuran and 3- Hydroxy- Carbofuran expressed as carbofuran)	mg/kg	BLQ (LOQ – 0.01)
62	Carbosulfan	mg/kg	BLQ (LOQ – 0.01)
63	Dazomet (Methylisothicyanate resulting from the use of dazomet metam)	mg/kg	BLQ (LOQ – 0.01)
64	Fenobucarb	mg/kg	BLQ (LOQ – 0.01)
65	Indoxacarb (sum of R and S isomers)	mg/kg	BLQ (LOQ – 0.01)
66	Iprovalicard	mg/kg	BLQ (LOQ – 0.01)
67	Mehomyl and Thiodicarb (sum of methymoyl and thiodicarb expressed as methomyl)	mg/kg	BLQ (LOQ – 0.01)
68	Propoxur	mg/kg	BLQ (LOQ – 0.01)
69	Thiobencarb	mg/kg	BLQ (LOQ – 0.01)
70	Thiodicarb	mg/kg	BLQ (LOQ – 0.01)

BLQ – Below Limit of Qualification

LOQ – Limit of Qualification

Table 7: Microbial load for Idivallathi mezhugu

S. No	Test Parameters	Units of Measurement	Result
Microbiological			
1	Total Plate Count	CFU/g	<10
2	Total Fungal count	CFU/g	<10

Toxicity studies

Acute oral toxicity study of Idivallathi mezhugu.

In **Acute toxicity study** carried out as per WHO guidelines, there were no treatment related death or signs of toxicity developed in wistar albino rats at dosage of 10 times the therapeutic dose (720 mg/kg b.wt) throughout the study period.

Further, no gross pathological changes have been seen in the internal organs of both control and treated groups.

Table 8: Dose finding experiment of Idivallathi Mezhugu

No	Dose mg/kg	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Control	+	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Test Group 10times therapeutic dose (720 kg/ b.wt)	+	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1. Alertness 2.Aggressiveness 3. Pile erection 4.Grooming 5.Gripping 6.Touch Response 7.Decreased Motor Activity 8.Tremors 9. Convulsions 10. Muscle Spasm 11.Catatonia 12. Muscle relaxant 13.Hypnosis 14.Analgesia 15.Lacrimation 16.Exophthalmos 17.Diarrhoea 18. Writhing 19. Respiration 20. Mortality

(+) - Present, (-) - Absent

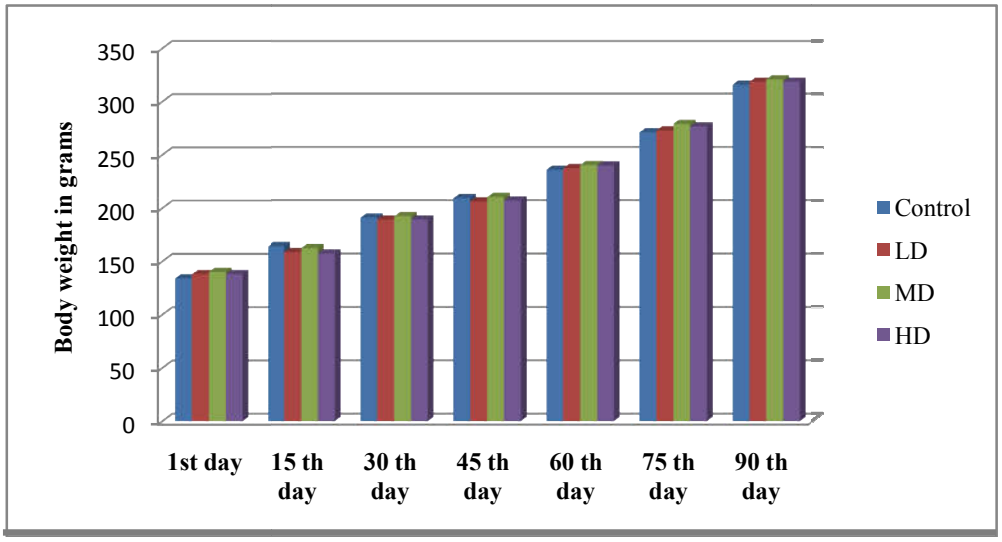
Long term toxicity study of idivallathi mezhugu

Table 9: Effect of Idivallathi Mezhugu on Body weight changes of female wistar albino rats in long term toxicity study

GROUPS	DAY 1	15	30	45	60	75	90
CONTROL	134.16± 4.21	164.16 ± 4.21	190.83 ±6.14	209.16 ±5.07	235.83± 4.21	270.83± 6.30	315.5± 6.44
LOW DOSE	138.12± 3.50	158.45 ±2.16	189.16 ±6.23	206± 4.21	237.38± 6.14	272.5± 5.02	318.24 ±6.12
MID DOSE	140.2± 2.13	162.36 ±5.07	192.12 ±4.21	210.2± 6.30	240.24± 6.14	278.8± 2.36	320.6± 5.07
HIGH DOSE	138.14± 2.46	157.25 ±1.67	189.25 ±5.26	207± 3.16	239.68± 4.21	276.26± 6.24	318.28 ±1.36

Values are mean± S.D. (Dunnett's test).*P<0.05,**P<0.01,N=12

Graph:1 Effect of Idivallathi Mezhugu on Body weight changes of female wistar albino rats in long term toxicity study



LD – Low dose; MD – Mid dose; HD – High dose

Table 10: Effect of Idivallathi Mezhugu on Body weight changes of male wistar albino rats in long term toxicity study

GROUPS	DAY 1	15	30	45	60	75	90
CONTROL	139.33± 4.13	173± 5.79	203± 5.79	236.16 ±9.24	288.66± 9.24	319.5± 8.50	359.5± 9.71
LOW DOSE	142.24± 4.12	174.12 ±5.26	204.16 ±4.23	239±9. 24	292.25± 6.23	320.1±9. 28	352.18 ±6.58
MID DOSE	152.16± 2.45	178.16 ±5.79	202.18 ±9.12	239.23 ±8.28	297.26± 5.20	326.5± 4.13	348.16 ±7.02
HIGH DOSE	148.16± 627	176± 5.12	206.33 ±2.4	240.25 ±9.24	296.67± 2.67	324.13± 4.12	347.4± 8.50

Values are mean± S.D. (Dunnett's test).*P<0.05,**P<0.01,N=12

Graph: 2 Effect of Idivallathi Mezhugu on Body weight changes of male wistar albino rats in long term toxicity study

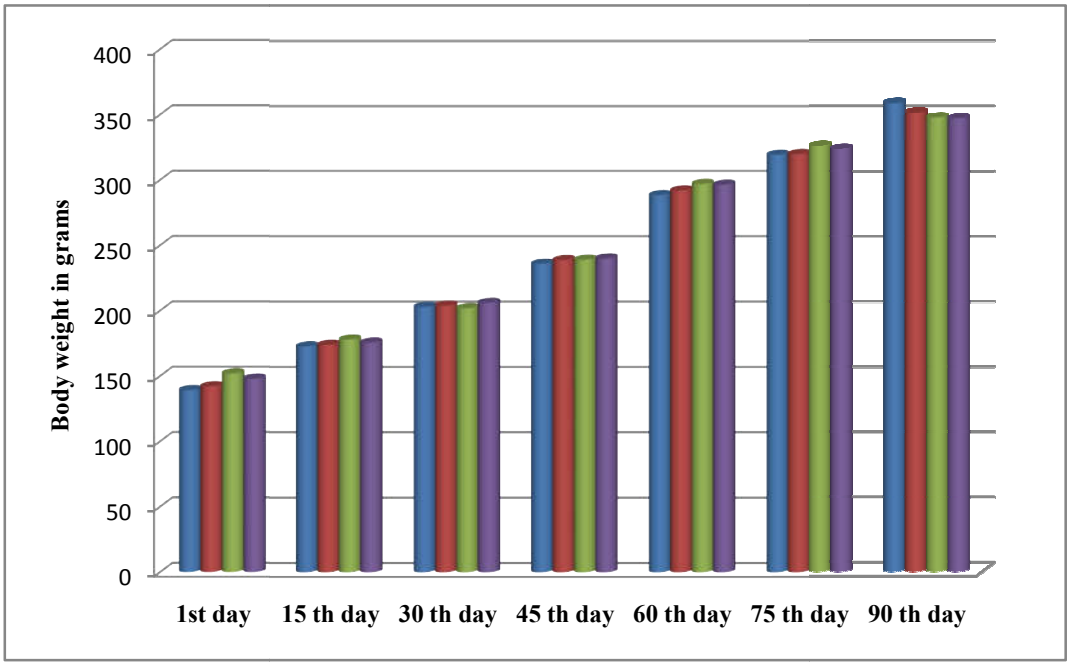


Table 11: Effect of Idivallathi Mezhugu on Food intake of wistar albino rats in long term toxicity study

GROUPS	DAY 1	15	30	45	60	75	90
CONTROL	5.54± 0.21	6.3± 0.18	6.7± 0.27	7.07± 0.17	7.07± 0.17	7.27± 0.27	7.60± 0.28
LOW DOSE	6.11± 0.21	6.4± 0.21	7.07± 0.17	7.08± 0.18	7.27± 0.27	7.37± 0.24	7.63± 0.25
MID DOSE	5.59± 025	6.7± 0.27	6.65± 0.18	7.07± 0.17	7.37± 0.24	7.60± 0.28	7.95± 0.11
HIGH DOSE	6.2±0.15	7.27± 0.27	7.45± 0.24	7.45± 0.25	7.45± 0.25	7.63± 0.25	7.75± 0.13

Values are mean± S.D. (Dunnett's test).*P<0.05,**P<0.01,N=12

Graph - 3 Effect of Idivallathi Mezhugu on Food intake of wistar albino rats inlong term toxicity study

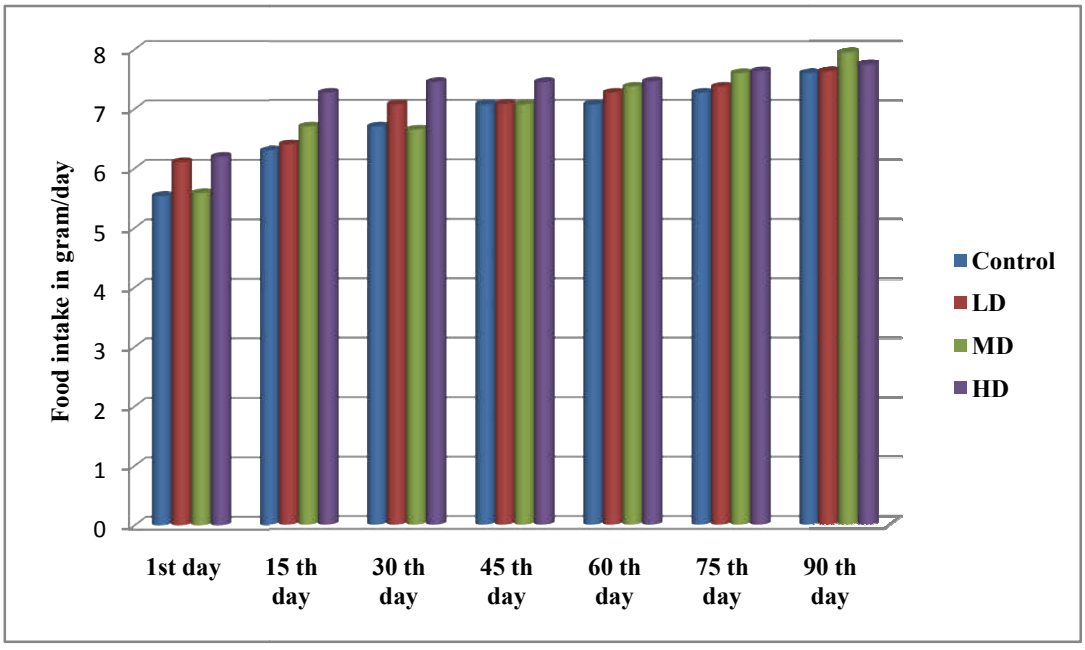


Table 12: Effect of Idivallathi Mezhugu on water intake of wistar albino rats in long term toxicity study

GROUPS	DAY 1	15	30	45	60	75	90
CONTROL	9.15± 0.13	9.52± 0.21	8.13± 0.12	9.96± 0.11	9.96± 0.11	9.96± 0.11	9.96± 0.11
LOW DOSE	8.13± 0.12	8.13± 0.12	8.13± 0.12	9.52± 0.17	9.52± 0.21	9.96± 0.11	10.30± 0.13
MID DOSE	9.15± 0.12	8.13± 0.12	9.52± 0.21	9.15± 0.12	9.96± 0.11	10.30± 0.13	9.96± 0.11
HIGH DOSE	9.20± 0.15	8.13± 0.12	8.13± 0.12	8.13± 0.12	9.52± 0.21	9.96± 0.11	9.96± 0.11

Values are mean± S.D. (Dunnett's test).*P<0.05,**P<0.01,N=12

Graph - 4 Effect of Idivallathi Mezhugu on water intake of wistar albino rats in long term toxicity study

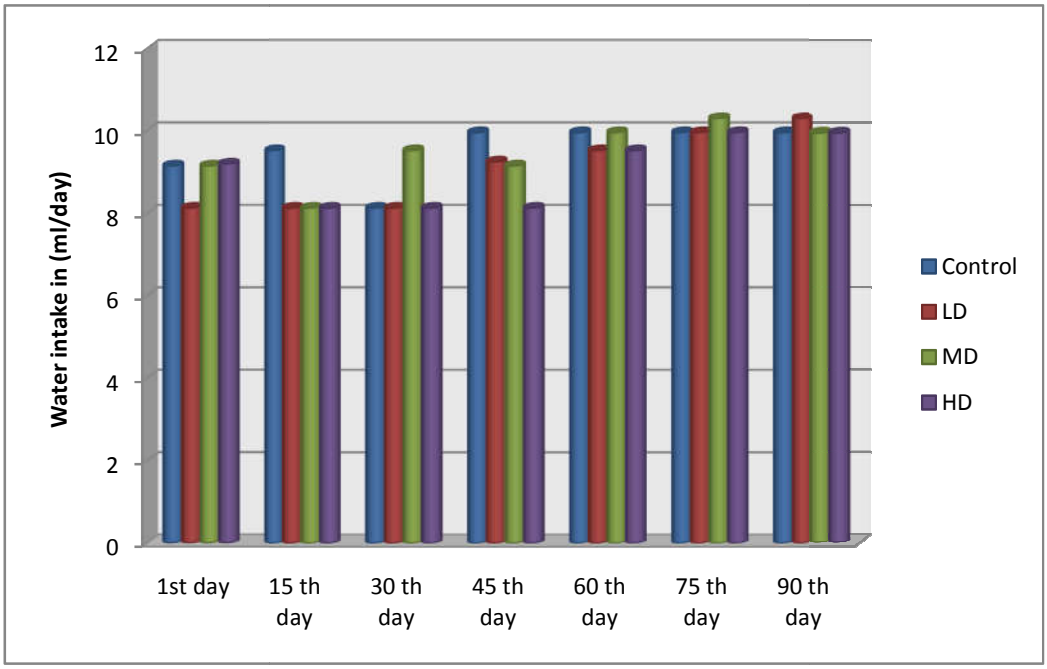
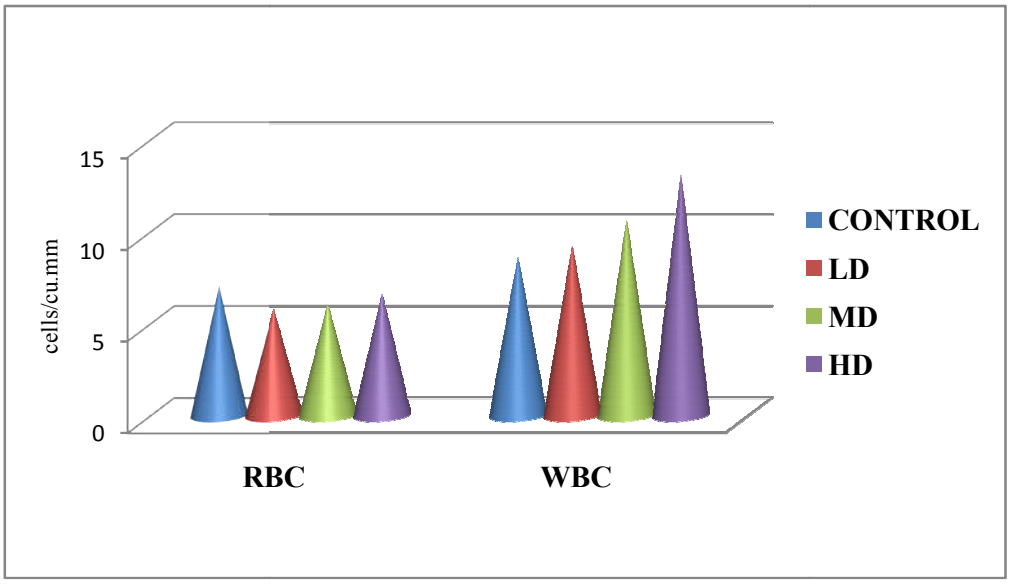


Table 13: Effect of Idivallathi mezhugu on Hematological parameters of wistar albino rats in long term toxicity study

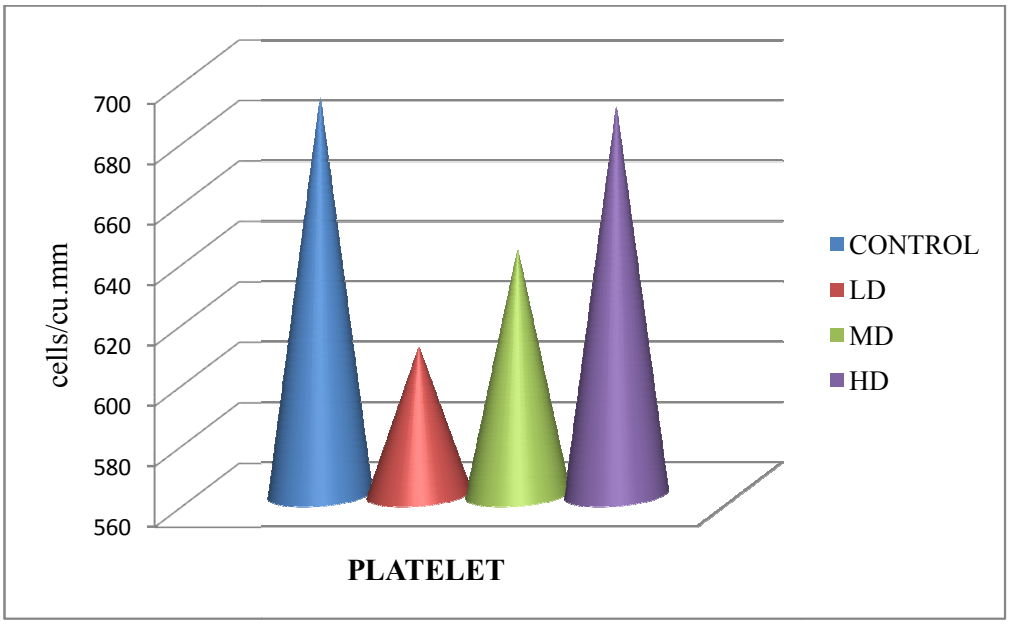
Parameters	Control	Low dose	Mid dose	High dose
RBC (X 10^6µl)	7.08±1.22	5.8±0.64*	6.05±0.95	6.61±1.48
WBC (X10^3/µl)	8.61±1.63	9.25±2.02	10.6±2.42	3.1±2.22**
PLATELET(X10^3/µl)	691.5±71.6	608.8±125.1	641.8± 184.62	688.4±148.2
HAEMOGLOGIN(g/dl)	13.7±0.94	14.6±1.25	13.16±1.47	13.6±1.2
MCH(pg)	19.5±1.67	19.1±3.25	18.8±2.26	19.5±2.24
MCV(fl)	59.7±3.4	58.4±7.3	62.3±3.9	61.1±4.1
NEUTRPHILLS (10^3/mm^3)	2.4±0.5	3.06±1.09	2.6±1.18	2.6±1.36
EOSINOPHILLS (%)	1.49±0.24	2.02±0.82	2.18±1.27	2.31±1.15
BASOPHILLS (%)	0.41±0.5	0.33±0.49	0.33±0.49	0.41±0.51
LYMPHOCYTE (%)	81.5±8.2**	66.2±14.9	71.18±9.12	71.75±14.11
MONOCYTE (%)	2.8±0.6	3.6±0.53	2.95±1.2	3.18±1.3

Values are mean of 12 animals ± S.D. (Dunnett's test). **($p < 0.01$),*($p < 0.05$), n = 12

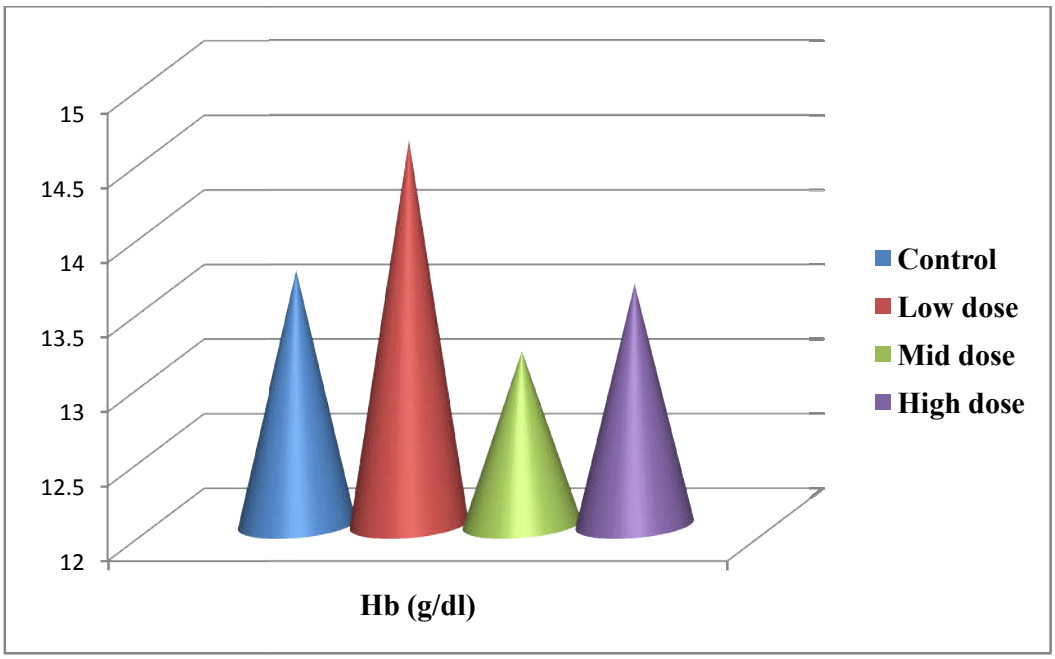
Graph – 5 Effect of Idivallathi Mezhugu on Haematological Parameters - RBC & WBC of wistar albino rats in long term toxicity study



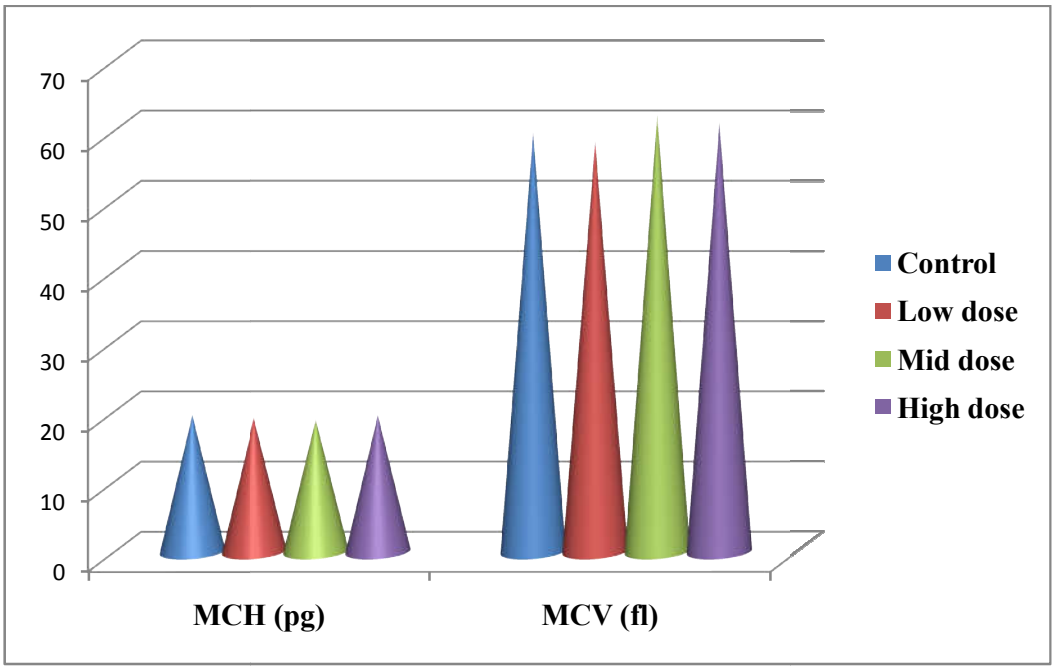
Graph – 6 Effect of Idivallathi Mezhugu on Haematological Parameters - Platelet count of wistar albino rats inlong term toxicity study



Graph – 7 Effect of Idivallathi Mezhugu on Haematological Parameters - Haemoglobin of wistar albino rats inlong term toxicity study



Graph - 8 Effect of Idivallathi Mezhugu on Haematological Parameters - MCH & MCV of wistar albino rats inlong term toxicity study



Graph – 9 Effect of Idivallathi Mezhugu on Haematological Parameters Differential count of wistar albino rats inlong term toxicity study

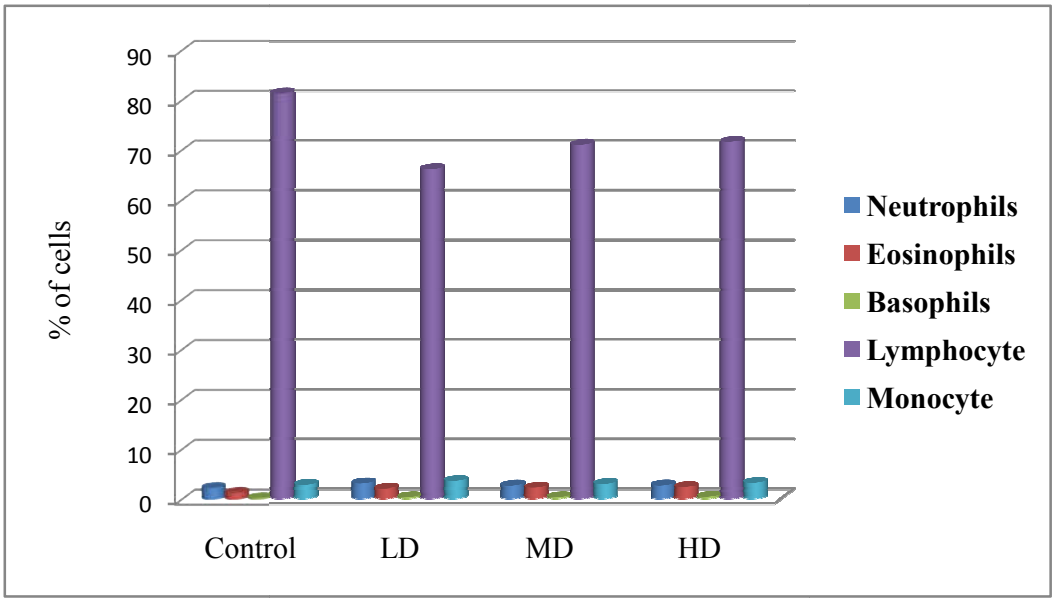
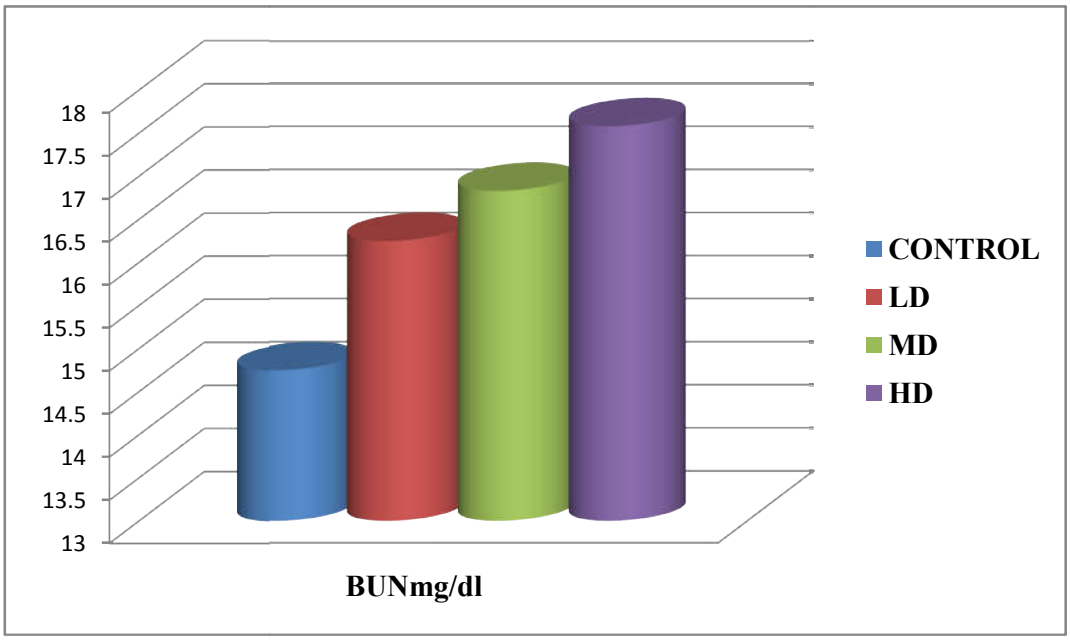


Table 14: Effect of Idivallathi Mezhugu On Biochemical Parameters - Renal function test of wistar albino rats inlong term toxicity study

Parameters	Control	Low dose	Mid dose	High dose
BUN(mg/dl)	14.75±2.34	16.25±2.26	16.83±2.24	17.58±3.23*
SERUM CREATININE (mg/dl)	0.64±0.23	0.74±0.15	0.7±0.16	0.68±0.25

Values are mean of 12 animals ± S.D.(Dunnett's test). **(p <0.01),*(p < 0.05), n = 12

Graph – 10 Effect of Idivallathi Mezhugu On Biochemical Parameters – BUN of wistar albino rats inlong term toxicity study



LD – Low dose; MD – Mid dose; HD – High dose

Graph – 11 Effect of Idivallathi Mezhugu on Biochemical Parameters – Creatinine of wistar albino rats in long term toxicity study

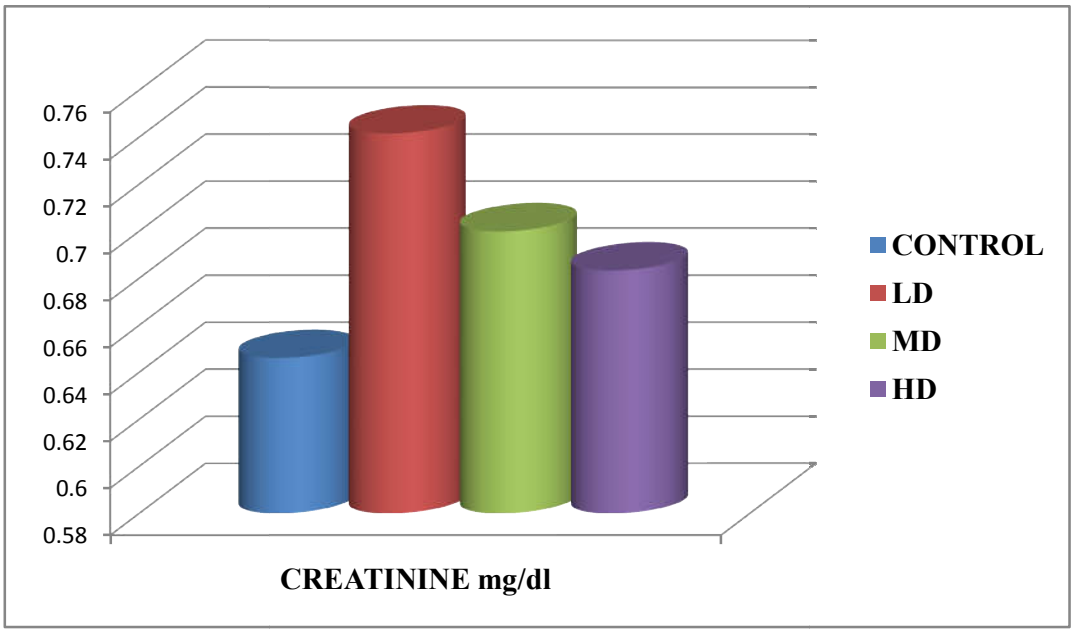
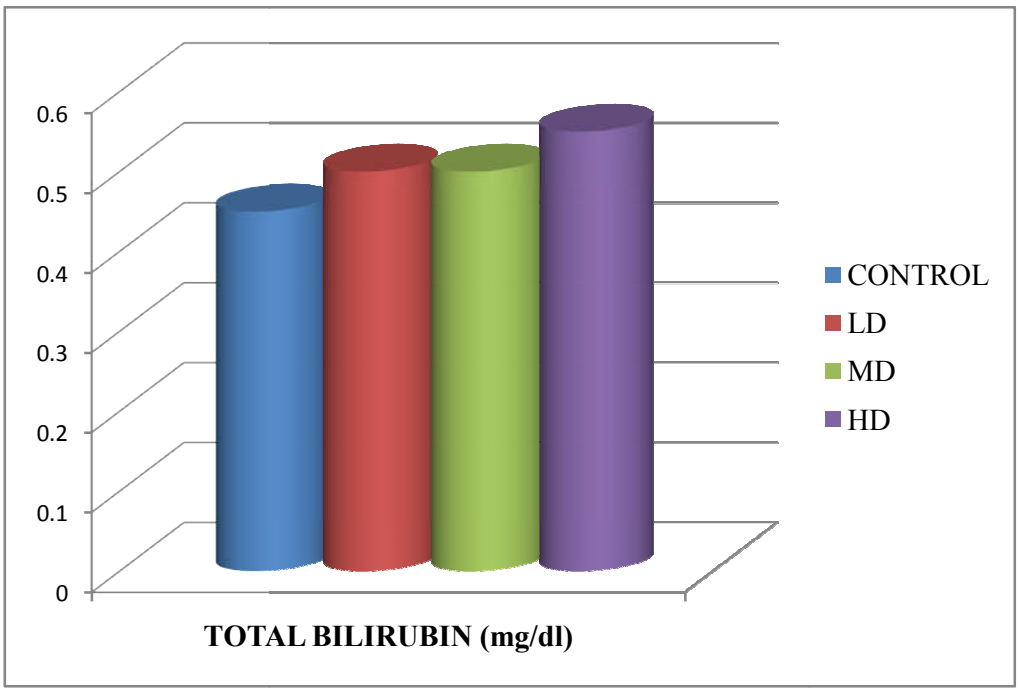


Table 15: Effect of Idivallathi Mezhugu on Biochemical Parameters – Liver function test of wistar albino rats in long term toxicity study

Parameters	Control	Low dose	Mid dose	High dose
Total Bilirubin mg/dl	0.45±0.2	0.45±0.2	0.5±0.2	0.55±1.92
SGOT U/dl	161.25±37.76	166.83±29.47	118.83±40.52	158.83±37.97
SGPT U/dl	46.16±14.37	47.41±15.05	48±23.70	53.91±14.61

Values are mean of 12 animals ± S.D. (Dunnett's test). ** ($p < 0.01$),*($p < 0.05$), n = 12

Graph – 12 Effect of Idivallathi Mezhugu on Biochemical Parameters – Total Bilirubin of wistar albino rats in long term toxicity study



Graph – 13 Effect of Idivallathi Mezhugu on Biochemical Parameters – SGOT &SGPT of wistar albino rats inlong term toxicity study

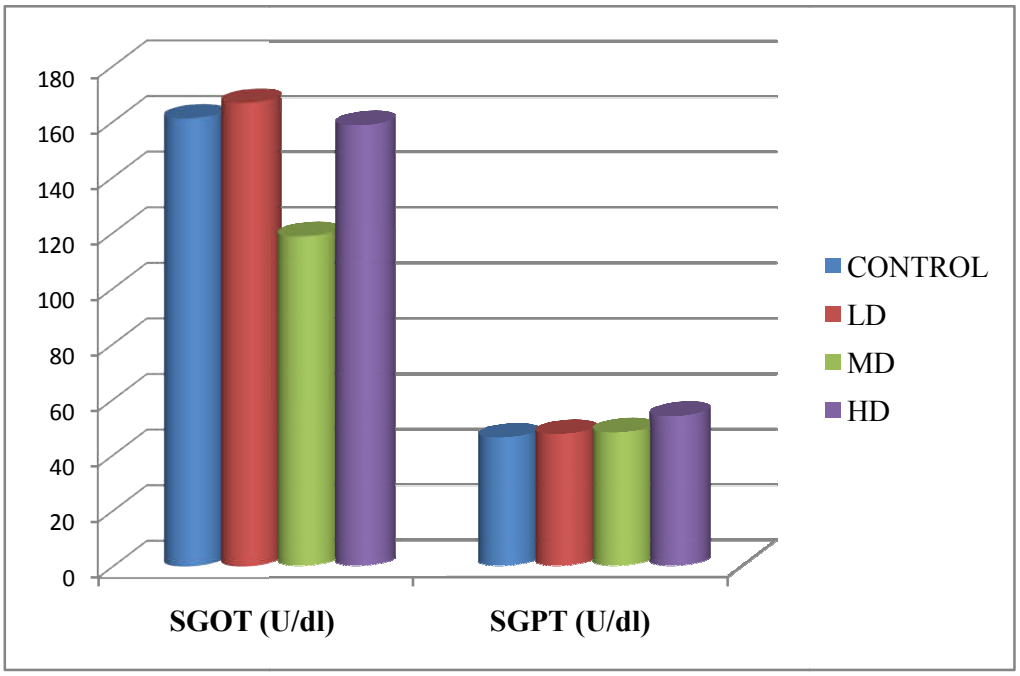
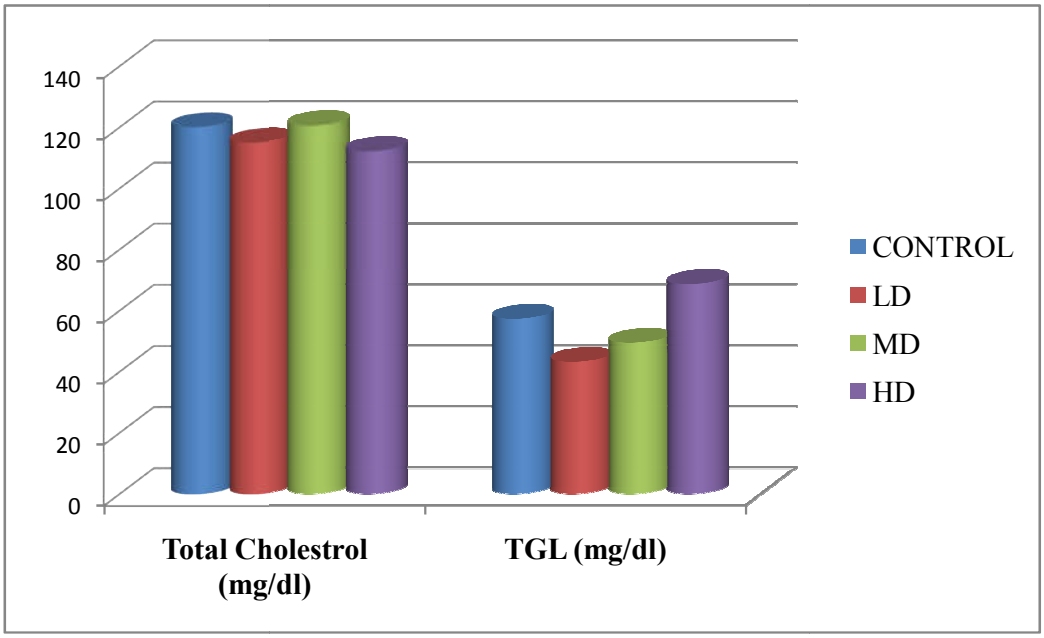


Table 16 Effect Of Idivallathi Mezhugu On Biochemical Parameters – Lipid Profile of wistar albino rats inlong term toxicity study

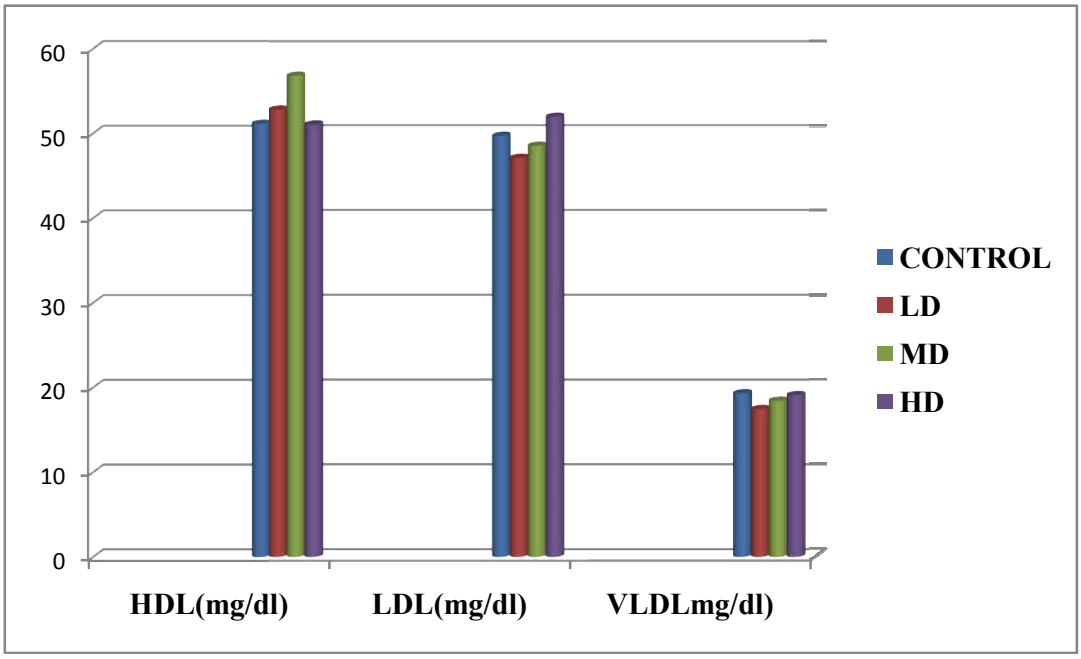
Parameters	Control	Low dose	Mid dose	High dose
Total Cholesterol (mg/dl)	120.24±14.79	115.15±10.4	120.72±19.03	112.26±37.28
HDL (mg/dl)	51.16±10.15	52.75±12.51**	56.75±13.53	51±16.92
LDL (mg/dl)	49.66±11.3	47.083±12.2	48.5±11.2	51.91±11.84
VLDL (mg/dl)	19.31±2.78	17.45±4.53	18.44±4.67	19.1±3.83
TGL (mg/dl)	57.25±29.41	43.16±14.83	49.41±23.34	68.66±23.79

Values are mean of 12 animals ± S.D.(Dunnett's test). ** ($p < 0.01$),*($p < 0.05$), n = 12

Graph – 14 Effect Of Idivallathi Mezhugu On Biochemical Parameters – Total cholesterol & TGL of wistar albino rats inlong term toxicity study



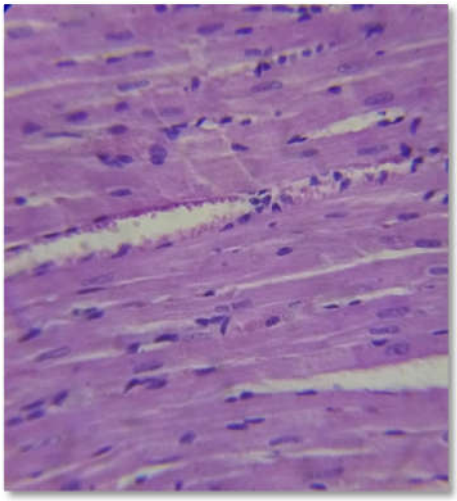
Graph – 15 Effect Of Idivallathi Mezhugu On Biochemical Parameters – HDL, LDL & VLDL of wistar albino rats inlong term toxicity study



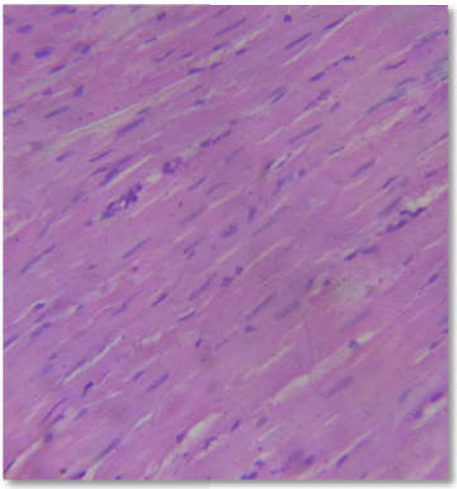
Histopathological Slides of wistar albino rats, stained with eosin and hematoxylin, under 40x magnification power in long term (90 days) toxicity study of IVM:

HEART

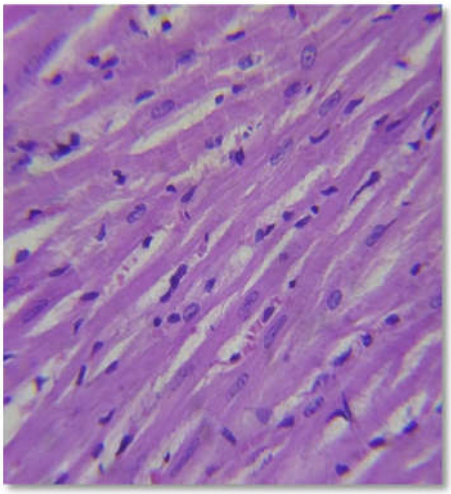
CONTROL



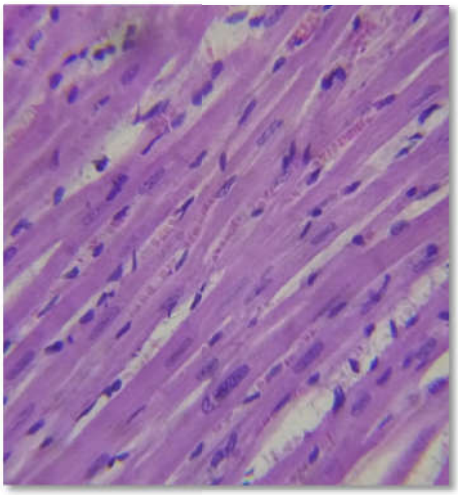
LOW DOSE



MID DOSE



HIGH DOSE



HEART

CONTROL :

- Perfectly -arranged myocardial fibers, clear transverse striation and normal structure were observed.
- Appearance of cardiomyocyte was normal with dark nuclear region. The nuclei of muscle fibers appear oval arrangement

LOW DOSE :

- Sarcoplasmic region of myocardium appears normal
- Nucleus appears prominent with regular arrangement of fibres.No evidence of pyknotic nucleus.

MID DOSE :

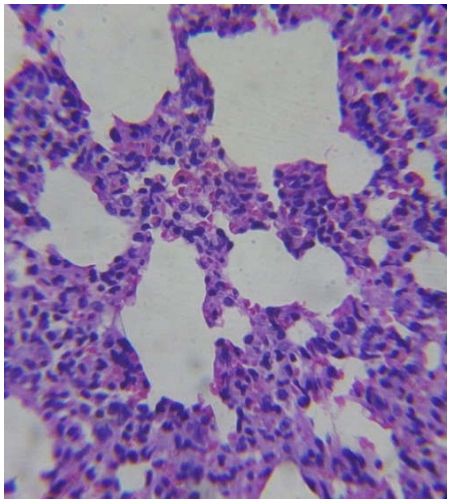
- Appearance of myocyte was normal
- Endocardium appears normal with no evidence of necrosis
- Fibres appears normal elongated and rod shaped

HIGH DOSE :

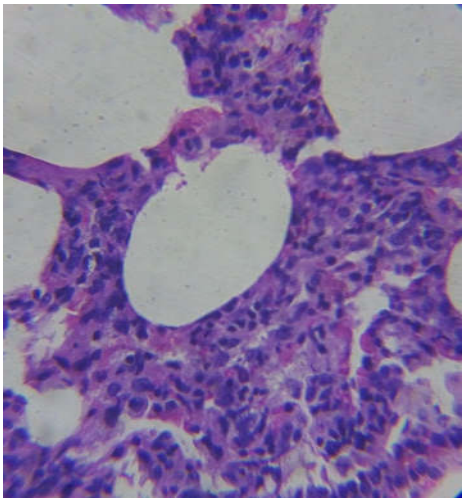
- Myocardial cells appears normal with well-defined mycoplasma and prominent nucleus and nucleolus

LUNGS

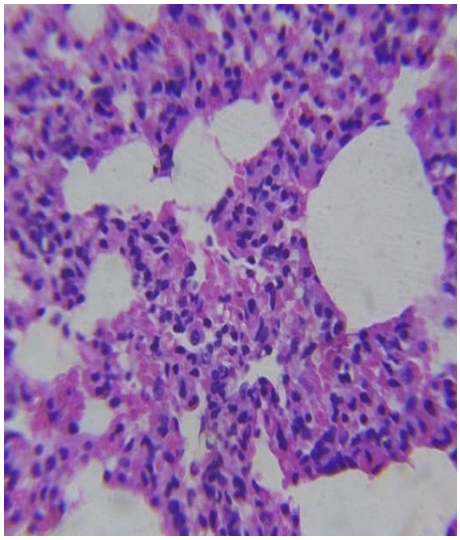
CONTROL



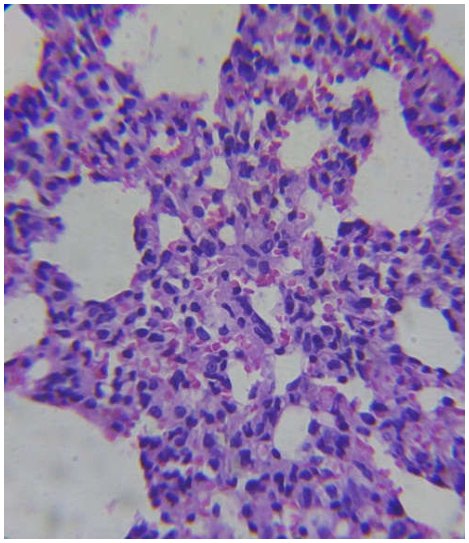
LOW DOSE



MID DOSE



HIGH DOSE



LUNGS :

CONTROL :

- Bronchial opening appears regular with no signs of infiltration
- Appearance of alveolar network was normal
- Nucleus of type I and II alveolar cells looks normal

LOW DOSE :

- Arrangement of epithelial and muscular appears normal
- Opening of lumen of blood vessels appears regular with no invasion of inflammatory cells

MID DOSE :

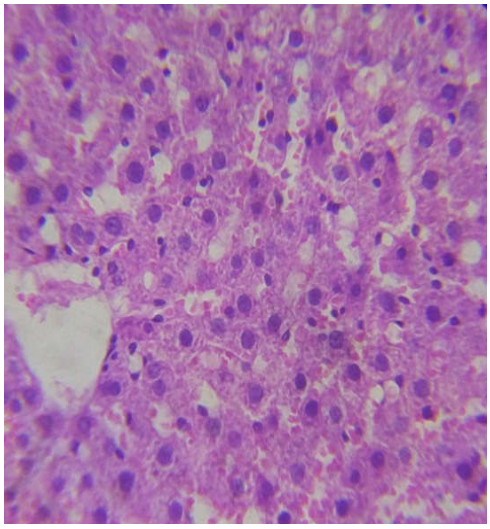
- Arrangement of epithelial and muscular appears normal
- Opening of lumen of blood vessels appears regular with no invasion of inflammatory cells

HIGH DOSE :

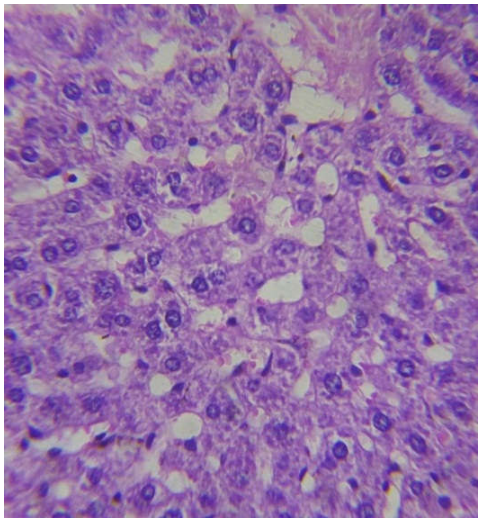
- Perivascular region appears normal, Alveolar septa and wall appeared widen and normal
- No signs of lymphocyte cuffing

LIVER

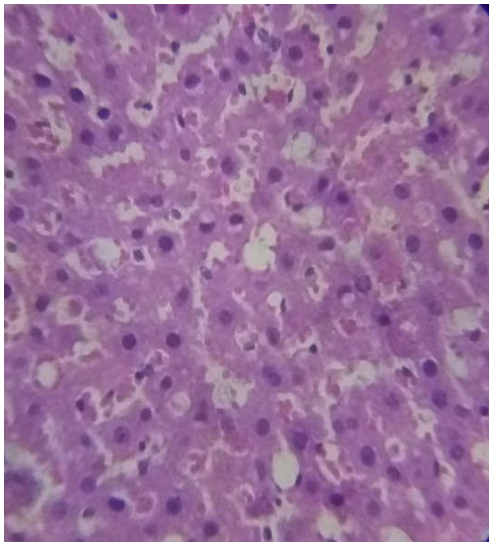
CONTROL



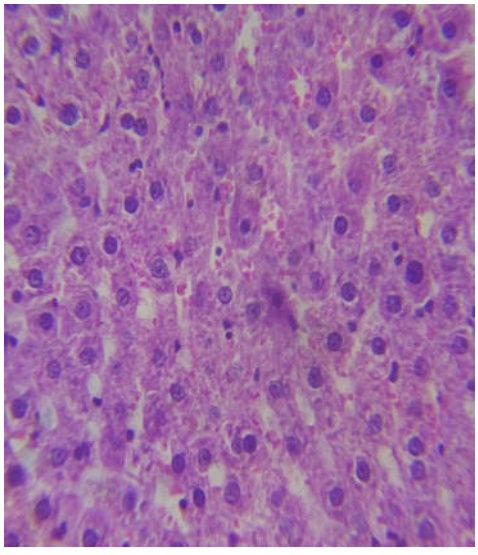
LOW DOSE



MID DOSE



HIGH DOSE



LIVER :

CONTROL :

- Rare appearance of Kupffer cells with no evidence of phagocytosis in intracytoplasmic region
- Liver parenchyma appears normal with no evidence of necrosis
- Appearance of terminal hepatic venules (central veins) to the portal tracts was normal

LOW DOSE :

- The centrilobular hepatocytes appears normal with stained cytoplasm
- No evidence of mesenchymal reaction on to the hepatic parenchyma
- centrilobular zone appears normal with stable network of hepatocytes
- The walls of the lumen appears normal with no evidence of ischemic changes

MID DOSE :

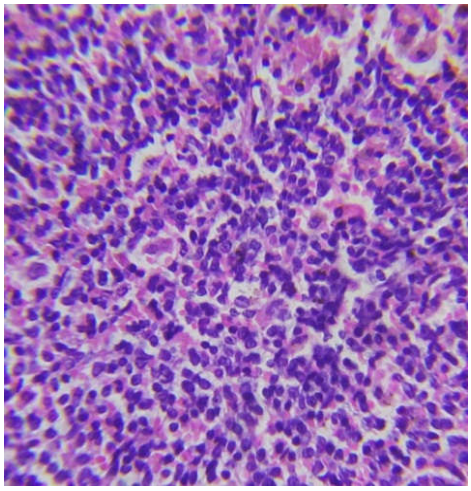
- Appearance of terminal hepatic venules (central veins) to the portal tracts was normal
- No signs of nodular degeneration and cirrhosis .
- No evidence of collagen (fibrosis)

HIGH DOSE :

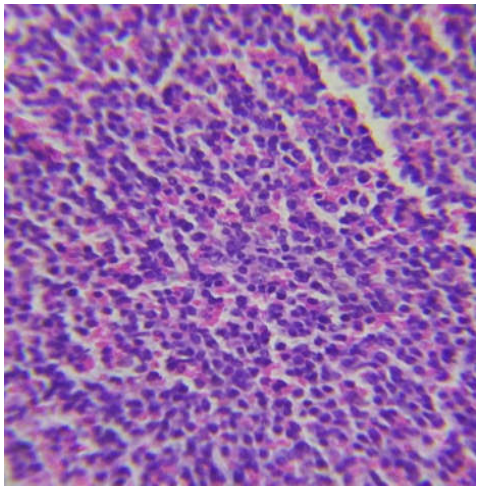
- Apparent loss of liver parenchyma were observed
- Increase distant of liver sinusoids were observed
- Occasional presence of Kupffer cells with no evidence of phagocytosis in intracytoplasmic region

SPLEEN

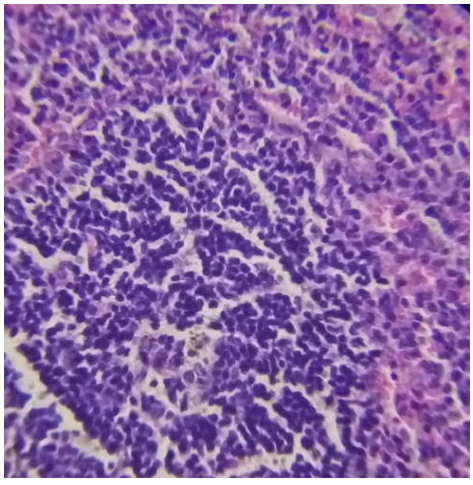
CONTROL



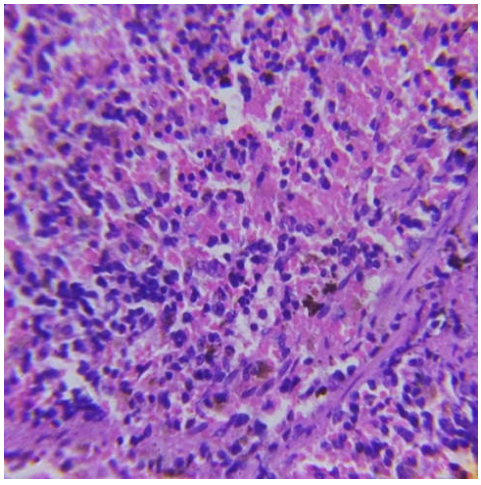
LOW DOSE



MID DOSE



HIGH DOSE



SPLEEN :

CONTROL :

- No signs of perivascular inflammation
- Appearance of splenic sinuses, Splenic cord and endothelial orientation was normal
- Appearance of LF – lymphoid follicle; PALS – periarterial lymphoid sheath was normal with no significant signs of enlargement

LOW DOSE :

- No signs of perivascular inflammation
- Appearance of splenic sinuses, Splenic cord and endothelial orientation was normal

MID DOSE :

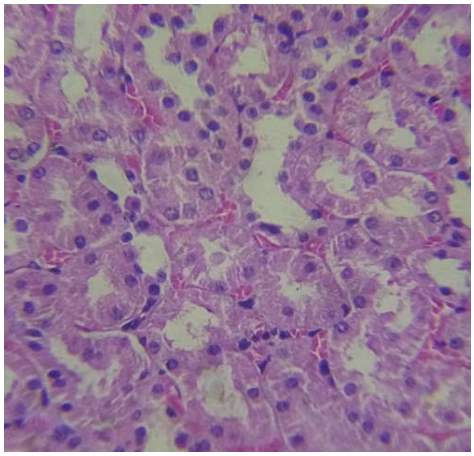
- Marginal vascular zone radiated in between red and white pulp
- Appearance of splenic red pulp was normal

HIGH DOSE :

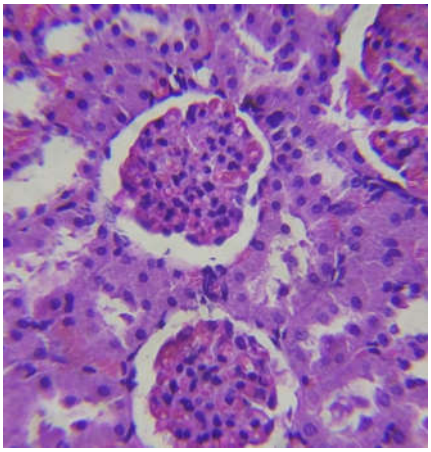
- Marginal vascular zone radiated in between red and white pulp
- Appearance of splenic red pulp was normal

KIDNEY

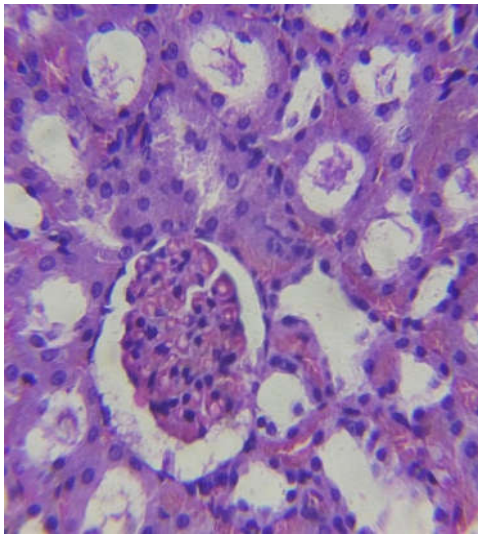
CONTROL



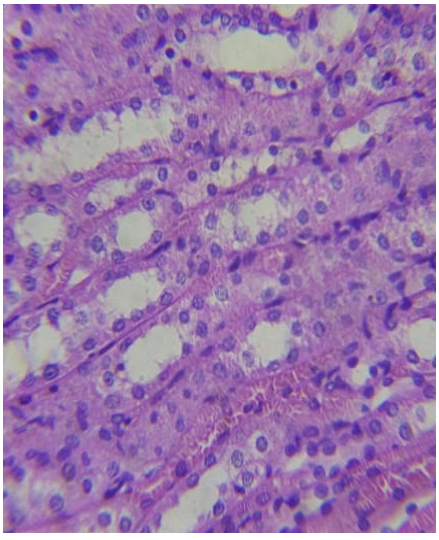
LOW DOSE



MID DOSE



HIGH DOSE



KIDNEY :

CONTROL :

- Appearance of Podocytes and parietal epithelium in the glomeruli appears normal
- Proximal and distal convoluted tubule appears normal
- No signs of lesion or inflammation were observed
- No signs of cellular necrosis

LOW DOSE :

- Appearance of Podocytes and parietal epithelium in the glomeruli appears normal
- Proximal and distal convoluted tubule appears normal

MID DOSE :

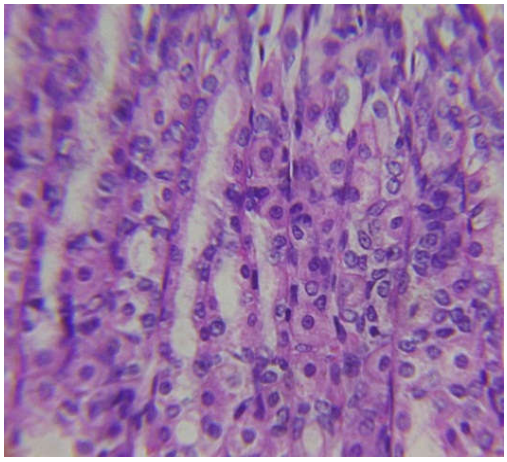
- Glomerular cell integrity appears mild derangement
- Basement membrane and nephrotic bundle appears dilated
- Mild congestion were observed
- Proximal and distal convoluted tubule appears normal

HIGH DOSE :

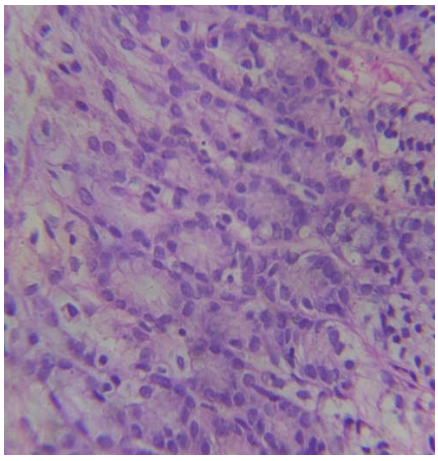
- Some renal tubules appears hypertrophic
- Appearance of Podocytes and parietal epithelium in the glomeruli appears normal

STOMACH

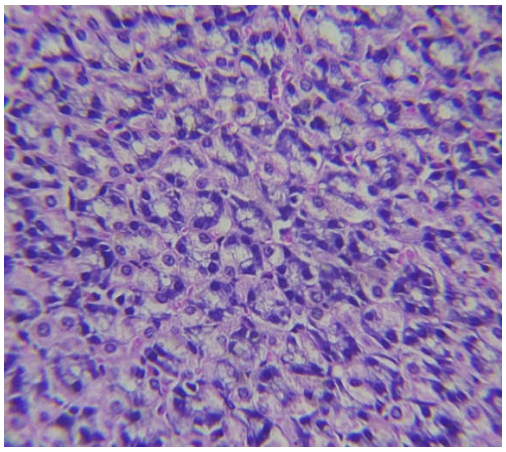
CONTROL



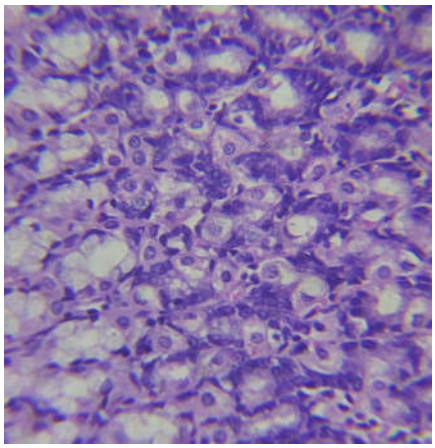
LOW DOSE



MID DOSE



HIGH DOSE



STOMACH :

CONTROL :

- Gastric glands, gastric glands including secretary sheath appears normal
- Normal gastric mucosa containing intact gastric gland cells, parietal cells which are spherical cell with deeply stained dark nucleus

LOW DOSE :

- Pyloric and fundus zone of stomach appear normal
- The continuity of mucosa was normal with no evidence of ulceration

MID DOSE :

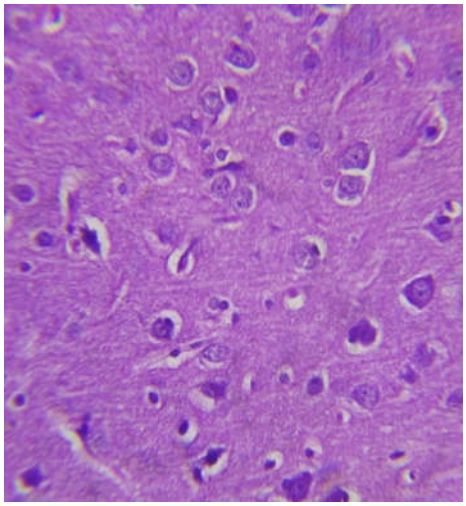
- Regular arrangement of muscularisexterna and outer longitudinal muscle were observed
- Regular histology of Inner circular muscle (ICM), gastric pit (GP), and muscularis mucosae (MM) were observed

HIGH DOSE :

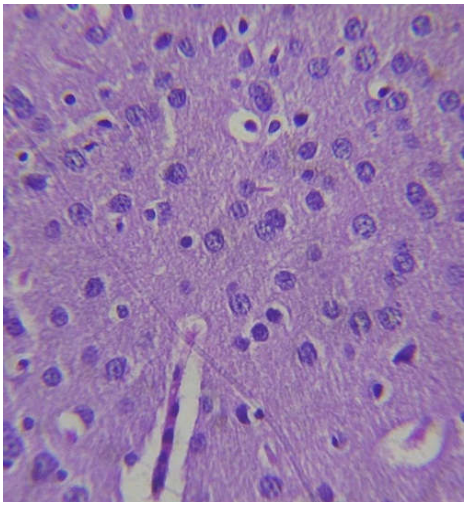
- No signs of ulcer and glandular degeneration were observed
- Appearance of Sub-mucosa and gastric glands appear normal

BRAIN

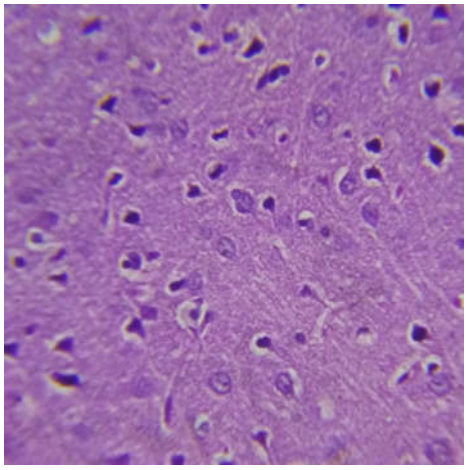
CONTROL



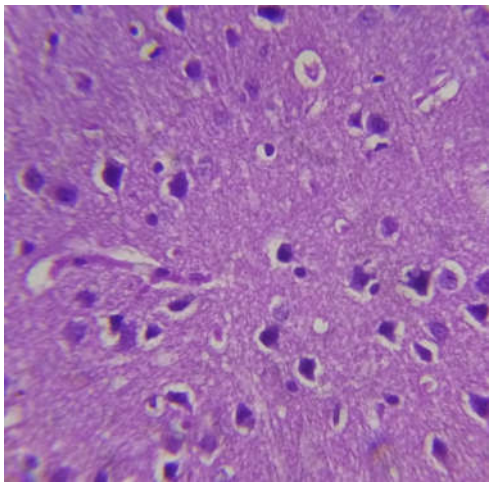
LOW DOSE



MID DOSE



HIGH DOSE



BRAIN :

CONTROL :

- Arrangement of the neurons appears intact with no signs of degeneration or apoptotic changes in both the samples
- Cortex region showed normal neurons with polygonal to round cell bodies containing dense cytoplasm.

LOW DOSE :

- No signs of edema or degeneration were observed.
- Arrangement of neurons on cerebral cortex appears normal and dense
- Dentate gyrus and CA3 pyramidal cells of the hippocampus appears normal

MID DOSE :

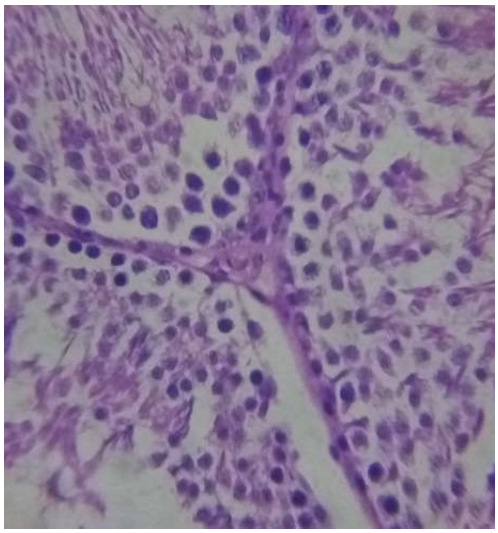
- Brain showing intact molecular and granular layer of neuronal cells
- Arrangement of the neurons appears regular with no signs of degeneration or apoptotic changes

HIGH DOSE :

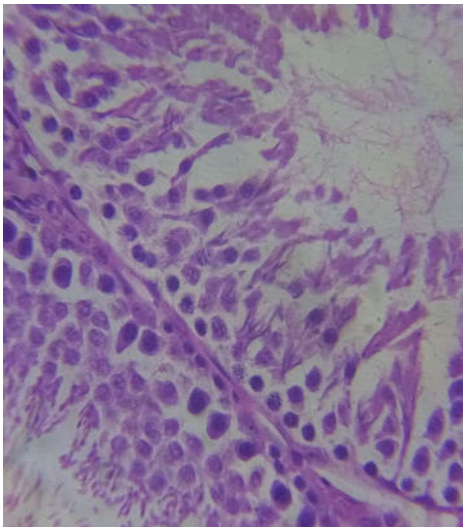
- Appearance of Hippocampal neurons was normal with dense network
- No signs of ischemic changes in the cerebral hemisphere

TESTES

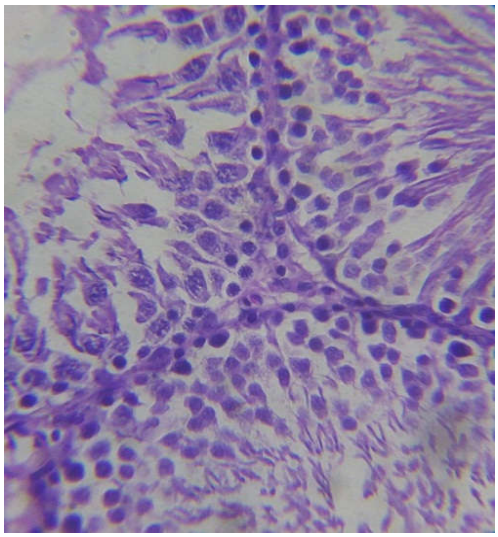
CONTROL



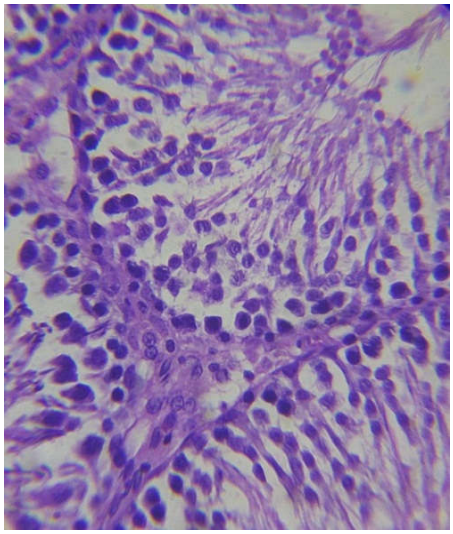
LOW DOSE



MID DOSE



HIGH DOSE



TESTES

CONTROL :

- Histo cytology of testicular tissue shows well differentiated germ cells with respect of spermatogonia includes spermatid and sperm were observed
- Appearance of leydig cells, interstitial tissue , seminiferous tubule, Sertoli cells and spermatogonia were normal

LOW DOSE:

- Presence of mature somatic cells project the perfect histomorphology of testicular cells were observed. Primary spermatocytes with large centered nucleus and dense chromatin were observed

MID DOSE :

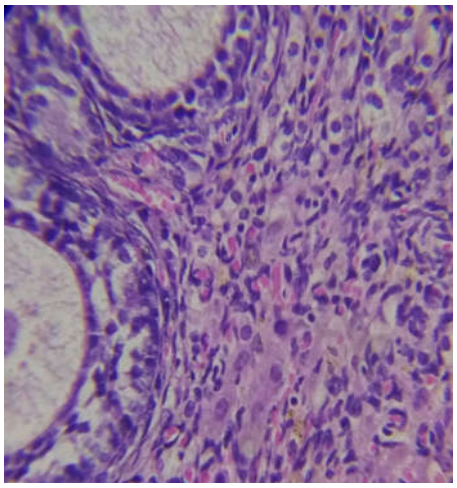
- Appearance of leydig cells, interstitial tissue , seminiferous tubule, Sertoli cells and spermatogonia were normal
- So signs of differential morphology were observed in the spermatocytes

HIGH DOSE :

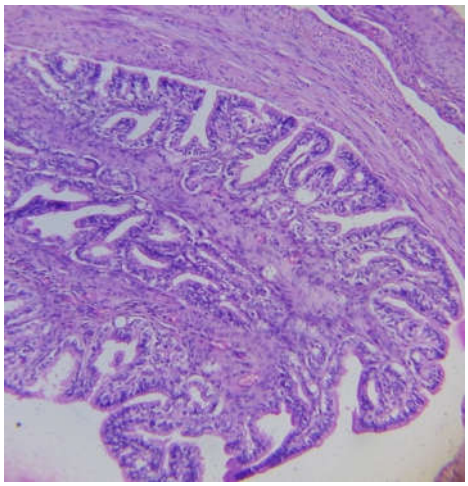
- Histo cytology of testicular tissue shows well differentiated germ cells with respect of spermatogonia includes spermatid and sperm were observed
- Appearance of leydig cells, interstitial tissue , seminiferous tubule, Sertoli cells and spermatogonia were normal

OVARY

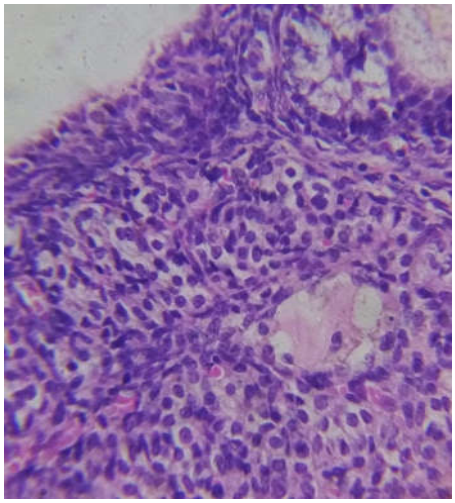
CONTROL



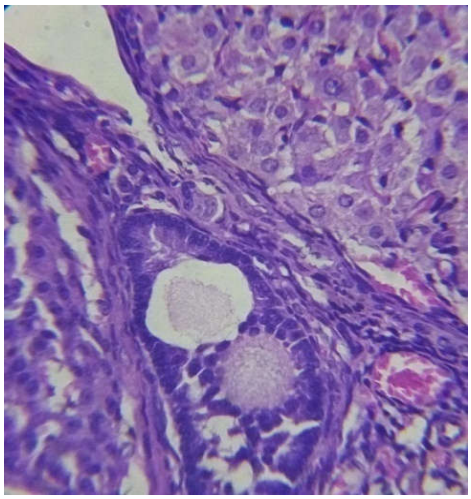
LOW DOSE



MID DOSE



HIGH DOSE



OVARY :

CONTROL :

- Histopathological analysis of ovary showing normal corpus luteum (CL) and Primordial follicles with few mature ovarian follicles with no signs of abnormality.

LOW DOSE :

- Histopathological analysis of ovary showing normal corpus luteum (CL) and Primordial follicles with few mature ovarian follicles with no signs of abnormality

MID DOSE :

- Appearance of antral follicle, primary oocyte and secondary follicles are norma

HIGH DOSE:

- Appearance of antral follicle, primary oocyte and secondary follicles are normal

CHAPTER 6

DISCUSSION

I have selected Idivallathi Mezhugu to evaluate the safety profile.First the test drug going to the process of standardization for qualitative and quantitative analysis**.** The following are the analysis

- Physico - chemical analysis
- Chemical Analysis
- Microbial load
- Aflatoxin
- Pesticide Residue
- AAS

The safety profile is evaluated by Acute and Long Term toxicity study on Wistar Albino rats as per WHO guidelines

The **Physico - chemical analysis** of IVM (Table: 1&2) concludes the following results

The loss on drying test is designed to measure the amount of water and volatile matters in a sample when the sample is dried under specified conditions. Moisture is one of the major factors responsible for the detoriation of the drugs and formulations. Low moisture content is always desirable for higher stability of drugs.The percentage of loss on drying of IVM was 5.86678% (Normal range: 1-20%). Since the loss of drying of IVM is low, the stability of the drug is higher.

The Ash limit Tests are designed to measure the amount of the residual. A high ash value is indicative of contamination, substitution, adulteration or carelessness in preparing the drug. The total ash values of IVM were 3.892% (Normal range: 1-25%). Since the value of total ash in SKC is low, it implies that the inorganic constituents is Low this indicates the purity of the drug.

The Acid-Insoluble Ash limit Test is designed to measure the amount of ash Insoluble to diluted hydrochloric acid. Acid-insoluble ash value of IVM is 0.7% (Normal

range: 0.1 – 10%) and it shows that a very small amount of the inorganic Constituent is insoluble in acid. It indicates the purity of the drug.

Extraction value determines the amount of active constituents in a given amount of the formulation when extracted with a solvent media such as water and alcohol. The water soluble and alcohol soluble extract values provide an indication of the extent of polar and non polar compounds respectively present in IVM. The extract values of Alcohol in IVM is 51.32% (Normal range:4-85%) and water is 16%(Normal range:4-85%). From the above result we conclude that water is a little better solvent of extraction than alcohol.

pH of the drug was 3.65 (Normal value:4-14). It denotes it is slightly acidic. Hence, in the oral administration of the drug it is expected to be absorbed quickly in the stomach. It reveals that SKC is expected to have better Bio-availability.

Chemical Analysis of Idivallathi mezhugu indicated the presence of Sodium, Sulphate, Chloride, Carbonate, Calcium, Potassium, Sodium, Mercury, Starch, Reducing sugar, Iron, Alkaloids, Anti pyrine, Aliphatic amino acid and meconic acid.

Phytochemical investigation to detect the presence of various phyto constituents in formulation IVM reveals the presence of alkaloids, carbohydrates, glycosides, flavonoids, diterpenes and quinone.

WHO has need for quality assurance of herbal products, including testing of Microbial load, pesticide residue and aflatoxin, hence the microbial load by API – II-VOL-2, aflatoxin level by GCMS, Pesticide residue by GCMS/ LC MS MS were studied in IVM, revealed Below detection limit of aflatoxin B1, B2, G1, G2 and all pesticide.

The drug was quantitatively analysed for heavy metals content by AAS. This analysis reveals the below detection limit of metals Arsenic, Mercury, Cadmium, and Lead in sample IVM.

In Acute toxicity study there was no abnormal signs reported at the dose level of (720 mg/kgb.wt) within 24hours in Wistar Albino Rats. No mortality and No pathological changes have been seen in the internal organs of both control and treated

groups in the 14 days study period. And the Body weight, food intake and water intake of animals are normal.

Long term Toxicity Study was conducted for about 90 days as per WHO guideline in 3 doses low dose (72mg/kg b.wt), mid dose(360mg/kg b.wt), high dose(720mg/kg b.wt). Animals were observed throughout the period. There was no significant change in body weight (Table: 10&9), water (Table: 12), and food intake (Table:11). After 90 days animals were sacrificed and blood samples were collected, investigated. The results revealed that there were significant in RBC count and very significant changes in WBC and Lymphocyte count. In biochemical parameter significant changes in SGOT and very significant changes in HDL. The histopathological study on the organs such as brain, heart, lungs, kidney, spleen, liver, stomach, uterus, ovary and testis was normal in control, low dose, mid dose and high dose groups.

CHAPTER 7

SUMMARY

The experimental formulation Idivallathi mezhugu has been chosen for our dissertation work described based on Siddha vaithiya thirattu. The prepared with the ingredients of purified Cherankottai (Semicarpus anacardium), Ell (Sesamum indicum), Chithira moolaverpattai (Plumbago indica), Kasthoori manjal (Curcuma aromatica), Karunjichiragam (Nigella sativa), kurosani Omam (Hyoscyamus niger), Kadukkai thol (Terminalia chebula), Valuzhuvai (Celastrus paniculatus), Vettrilai kambu (Piper bettle), Thippli (Piper longum), Koshtam (Saussrea lappa), Vettrilaikambu (Piper bettle) Kopparai Thengai (Kernel of dried coconut), palm jaggery and Rasakarpooram (Hydragyrum subchloride). Traditionally the chosen formulation has been prescribed for patients suffering Soolai (Pain)**,** Kushtam (Leprosy), kiranthi (Syphilis), envgaigunmam (Peptic ulcer), etc.

The aim of the research work was to study the safety of the experimental formulation by acute and long term toxicity studies in the animal models. The ingredients were purchased from standard raw drug markets. All the individual components have been purified as per the Siddha literature and formulation was prepared in NIS Gunapadam lab.

Idivallathi mezhugu was analysed qualitatively and quantitatively with, PHYSICO CHEMICAL, CHEMICAL, MICROBIAL LOAD, AFLATOXIN, PESTICIDE RESIDUE, AAS ANALYSIS and to evaluate safety by acute and long term toxicity studies.

Initially the test drug was subjected to **physico chemical analysis.** It reveals the increased bioavailability and purity of the drug. Then the samples were analysed for chemical constituents. It reveals the presence of constituents like Sodium, Sulphate, Chloride, Carbonate, Calcium, Potassium, Sodium, Mercury, Starch, Reducing sugar, Iron, Alkaloids, Anti pyrine, Aliphatic amino acid and meconic acid and presence of phyto constituents like alkaloids, carbohydrates, glycosides, flavonoids, diterpenes and quinone

Microbial load aflatoxin and pesticide residue level were quantitatively measured in Idivallathi mezhugu the result indicate the below detectable limit of them.

Heavy metal analysis was carried out in Idivallathi mezhugu by AAS to ensure the absence of Arsenic, Mercury, Cadium, and Lead.

In Acute toxicity study there was no abnormal signs reported at the dose level of (720 mg/kg b.wt) within 24hours in Wistar Albino Rats. No mortality and No pathological changes have been seen in the internal organs of both control and treated groups in the 14 days study period. And the Body weight, food intake and water intake of animals are normal.

Long term Toxicity Study was conducted for about 90 days as per WHO guideline in 3 doses low dose (72 mg/kg b.wt), mid dose (360 mg/kg b.wt), high dose (720 mg/kg b.wt). Animals were observed throughout the period. There was no significant change in body weight (Table: 10&9), water (Table: 12), and food intake (Table: 11). After 90 days animals were sacrificed and blood samples were collected, investigated. The results revealed that there were significant in RBC count and very significant changes in WBC and Lymphocyte count. In biochemical parameter significant changes in SGOT and very significant changes in HDL. The histopathological study on the organs such as brain, heart, lungs, kidney, spleen, liver, stomach, uterus, ovary and testis was normal in control, low dose, mid dose and high dose groups.

CONCLUSION

From the results of this study, the Qualitative analysis of Idivallathi mezhugu (IVM) reveals the Purity and Bioavailability of the drug. As heavy metals were found to be within the permissible limit, the drug is safe enough for oral consumption. In vivo toxicity studies indicate that there was no mortality and signs of toxicity observed for acute oral administration of IVM till the dose of ten times the therapeutic dose (720 mg/kg b.wt) in the prescribed manner. In long term toxicity study there was significantly changes in haematological, biochemical parameter in IVM treated groups when compared to control group but the levels were within physiological limit. The histopathology report also confirms that there are no remarkable cellular changes at all the dose levels. It clearly demonstrates that there was No Observed Adverse Effect Level (NOAEL) upto the high dose level (720 mg/kg b.wt) , which is ten times that of therapeutic dose. Based on these results it can be conclude that , the dose level of Idivallathi mezhugu 0.8gm(Sundai alavu) for a duration of oru mandalam (45 days) (BD/day) mentioned in the Siddha literature Siddha vaithiya thirattu is safe dosage for human consumption.

In future it is to be carried out to study the pharmacological activity and clinical trial to prove the efficacy of the drug.

CHAPTER 9

BIBILIOGRAPHY

1.Siddha system of medicine, Department of AYUSH ministry Health & welfare family, Government of India.

2. A Dossier on Siddha System, Central council of Siddha medicine & research.

3.Dr.R.Thiyagaran,L.I.M., Siddha maruthuvam – Sirappu, Indian medicine & Homeopathy Department, Chennai.3rd Edition

4. World Health Organization guide line

5.Shukla SS, Saraf S, Saraf S Fundamental Aspect and basic concept of siddha medicine. Vol – 2. Systemic reviews in pharmacy/Jan – June 2011/issue

6. Dr. K.N. Kuppusamy muthaliyar,H.P.I.M, Dr. K.S.Uthamarayan, H.P.I.M, Siddha Vaithiya Thirattu, Indian medicine and Homeopathy department, Chennai.2nd Edition.

7. K.S.Murugesa muthaliyar, Gunapadam muthal pagam (porutpanpu nool) Indian medicine and Homeopathy department. 9th Edition.

8. K.S.Murugesa muthaliyar, Nanju murivu nool, Indian medicine and Homeopathy department, 3rd Edition.

9. Siddha marunthukalin seimurai IMCOPS, India marnthuvarkal kootturavu marunthu seinilayam mattrum pandakasalai, Thiruvanmiyur.

10. Dr.K.M.Nadkranis, Indian Materia Medica,Popula prakashan pvt,ltd. Third edition revised and enlarged 2005.Volume -1.

11. http://en.wikipedia.or/wiki/semecapus-anacardium.

12. http:www.itis.gov/servlet/singleRpy/single Rpt search_tpoic=TSN& research -value.

13.Lt-Colonel K.R.Kiritikar,F.L.S., I.M.S(Retired), Major B.D.Basu,M.R.C.S.(Eng) I.M.S(Retired) Indian medicinal plants , Volume – 3. Interntaional book distributors, Second edition.

14.Dr. K.S.Narayanan Reddy, The essential forensic medicine and toxicology, The Health Sciences Publishers, 33rd edition.

15. Pharmacology, Phytochemistry and Toxicology of *Semecarpus anacardium*

16. Mathivadhani P[1], Shanthi P, Sachdanandam P Apoptotic effect of Semecarpus anacardium nut extract on T47D breast cancer cell line

17. Weimin Zhao, Lili Zhu, Sowmyalakshmi Srinivasan, Chendil Damodaran, and Jürgen Rohr Identification of urushiols as the major active principle of the Siddha herbal medicine Semecarpus Lehyam: Anti-tumor agents for the treatment of breast cancer. NIH Public Access Author Manuscript. Published in final edited form as: Pharm Biol. 2009 September 1; 47(9): 886–893.

18. Joice P. Joseph, Sunant K. Raval, Kamlesh A. Sadariya, Mayur Jhala and Pranay Kumar Anti Cancerous Efficacy Of Ayurvedic Milk Extract Of Semecarpus Anacardium Nuts On Hepatocellular Carcinoma In Wistar Rats. Joseph et al., Afr J Tradit Complement Altern Med. (2013) 10(5):299-304 http://dx.doi.org/10.4314/ajtcam.v10i5.12.

19. In Vitro Anticancer Potential Of Semecarpus Anacardium Linn Drug Development And Therapeutics Vol. 7 | Issue 1 | Jan-Jun 2016.

20. Hakkim P.M.Abdulla sayupu Anupoga vaithiya navaneetham, Thamarai Noolagam, Chennai.2nd edition. Part – 8. Pg no:

21. Hakkim P.M.Abdulla sayupu Anupoga vaithiya navaneetham, Thamarai Noolagam, Chennai.2nd edition. Part – 9. Pg no:

22. R.C.Mohan Agaththiyar vaithiya vallathi – 600 pg no :

23.https://www.itis.gov/servlet/singleRpt/singleRpt/search_topic=TSN&search_value_3443.

24. Prof. (Mrs.)Asima Chatterjee Dr.Satyesh Chandra Pakrashi.The treatise on Indian medicinal plants. Kaushal Kishore, N.S.Parvathi, S.P.Singh. 2nd Edition. Volume – 5.

25. Munish Kumar, Anjoo Kamboj, Sidhraj S. Sisodia Hepatoprotective Activity Of *Sesamum Indicum* Linn. Against Ccl_4-Induced Hepatic Damage in Rats. International Journal of Pharmaceutical & Biological Archives 2011; 2(2):710-715. Received 21 Jan 2011; Revised 28 Feb 2011; Accepted 08 Mar 2011.

26. H.S. Vishwanath, K.R. Anilakumar, S.N.Harsha, Farhath Khanum And A.S. Bawa

27. In Vitro Antioxidant Activity Of Sesamum Indicum Seeds Asian Journal of Pharmaceutical and Clinical Research Vol 5, Suppl 1, 2012 ISSN - 0974-2441.

28. 1st Palanisamy Bhuvaneswari, 2nd Shanmugasundaram Krishnakumari Acute and sub-acute oral toxicity studies of ethanolic extract of sesamum indicum seeds (Linn.) In wistar albino rats **Article** · January 2012 *with* 111 Reads.

29. Kannusamy parambarai vaithiyam.Pg no: 104, 169

30. The Siddha pharmacopeia

31. Indian medicinal plants

32.https://googleweblight.com/iu=https://www.itis.gov/servlet/singleRpt/singleRptsearch_topic.

33. The treatise of Indian medicinal plants Volume – 4

34. 1st Angatahalli Chandrashekaraiah Sharada, 2nd Dr. F. Emerson Solomon Toxicity of Withania Somnifera Root Extract in Rats and Mice Article · January 1993 *with* 145 Reads DOI: 10.3109/13880209309082943.

35. Kamel F. Khazal1, Donald L. Hill Withania somnifera extract reduces the invasiveness of MDA-MB-231 breast cancer and inhibits cytokines associated with metastasis. J Cancer Metastasis Treat 2015;1:94-100. Received: 23-01-2015; Accepted: 15-04-2015. Source of Support: Nil, Confl ict of Interest: None declared.

36. Mary Grace Jinukuti and Archana Giri Anticancer activity of acetone and methanol extracts of Terminalia chebula Retz and Withania somnifera (Linn.) Dunal on HeLa cell line. Annals of Phytomedicine 4(2): 88-92, 2015 Received September 15, 2015: Revised October 5, 2015: Accepted October 10, 2015: Published online December 30, 2015.

37. Rajeev Nema, Sarita Khare, Parul Jain and Alka Pradhan Anticancer Activity of Withania Somnifera (Leaves) Flavonoids Compound. Int. J. Pharm. Sci. Rev. Res., 19(1), Mar – Apr 2013; n^{o} 21, 103-106 ISSN 0976 – 044X.

38. https://www.itis.gov

39. Encyclopedia of world medicinal plants vol – 4

40. Tiantian She, Chuanke Zhao, Junnan Feng, Lixin Wang, Like Qu, Ke Fang, Shaoqing Cai, Chengchao Shou Sarsaparilla (Smilax Glabra Rhizome) Extract Inhibits Migration and Invasion of Cancer Cells by Suppressing TGF-β1 Pathway Received: June 28, 2014 Accepted: January 12, 2015 Published: March 5, 2015.

41. Hye-Kyung Seo, Jong-Hwa Lee, Hyun-Su Kim, Chang-Kwon Lee, and Seung-Cheol Lee Antioxidant and Antimicrobial Activities of Smilax china L. Leaf Extracts Food Sci. Biotechnol. 21(6): 1723-1727 (2012) DOI 10.1007/s10068-012-0229-4. Received: 22 May 2012 / Revised: 6 July 2012 / Accepted: 6 July 2012 / Published Online: 31 December 2012.

42. Bo Cao1, Zihan Zhang, Yuqin Zhang, Jiaquan Li, Gang Liang And Jianghong Ling Effect of *Smilax china* L.-containing serum on the expression of POLD1 mRNA in human hepatocarcinoma SMMC-7721 cells.

43. Indian herbal pharmacopeia Volume – II. Indian drug manufacturers association & Regional research laboratory. Pg no: 33, 34, 439

44. Neha Arora And Shashi Pandey-Rai *Celastrus Paniculatus*, An Endangered Indian Medicinal Plant With Miraculous Cognitive And Other Therapeutic Properties: An Overview. Int J Pharm Bio Sci 2012 July; 3(3): (P) 290 - 303

45. Priyatama V. Powar and Dr. K. S. Patil screening Of Endophytic Fungi Isolated From Celastrus Paniculatus For Antimicrobial Potential World Journal Of Pharmacy And Pharmaceutical Sciences Sjif Impact Factor 5.210 .Volume 4, Issue 07, 717-722. Research Article Issn 2278 – 43

46. Badrul Alama, Ekramul Haqueb, Anti-Alzheimer and Antioxidant Activity of Celastrus paniculatus Seed Iranian Journal of Pharmaceutical Sciences Winter 2011: 7(1): 49-56 ijps.sums.ac.ir.

47. Yogesh A. Kulkarni, Sneha Agarwal, and Mayuresh S. Garud Effect of Jyotishmati (*Celastrus paniculatus*) seeds in animal models of pain and inflammation.

48. Chandan Singh, Santosh K. Singh, Gopal Nath and N.P. Rai Anti-mycobacterial activity of *Piper longum* L. fruit extracts against multi drug resistant *Mycobacterium* Spp. International Journal of Phytomedicine 3 (2011) 353-361

49. Ashalatha M1, Rekha B Sannappanawar A Review Article On Pippali (Piper Longum Linn) IAMJ: Volume 3; Issue 9; September- 2015.

50. E.S Sunila, G Kuttan Immunomodulatory and antitumor activity of *Piper longum* Linn. and piperine. Amala Cancer Research Centre, Amalanagar, Thrissur 680 553, Kerala, India.

51. Amin F. Majdalawieh, Muneera W. Fayyad Recent advances on the anti-cancer properties of Nigella sativa,a widely used food additive Journal of Ayurveda and Integrative Medicine 7 (2016) 173e180 Received 30 April 2016 Received in revised form 18 July 2016 Accepted 27 July 2016 Available online 17 September 20.

52. Md. Asaduzzaman Khan1, Han-chun Chen, Mousumi Tania1 and Dian-zheng Zhang Anticancer Activities Of Nigella Sativa (Black Cumin) Khan et al., Afr J Tradit Complement Altern Med. (2011) 8(S):226-232.

53. Al-Khalaf M.I and 1,3Kholoud S. Ramadan Antimicrobial and Anticancer Activity of Nigella sativa oil –A Review Australian Journal of Basic and Applied Sciences, 7(7): 505-514, 2013ISSN 1991-8178.

54. Maria P. Torres, Moorthy P. Ponnusamy, Subhankar Chakraborty, Lynette M. Smith,Srustidhar Das1, Hwyda A. Arafat, and Surinder K. Batra, Effects of Thymoquinone in the Expression of Mucin 4 in Pancreatic Cancer Cells: Implications for the Development of Novel Cancer Therapies Published OnlineFirst April 27, 2010; DOI: 10.1158/1535-7163.MCT-10-0075.

55. Hammad Shafiq , Asif Ahmad, Tariq Masud, Muhammad Kaleem Cardio-protective and anti-cancer therapeutic potential of Nigella sativa. Iranian Journal of Basic Medical Sciences .

56. Imtiyaz Ahma, Jagrati Tripathi, Manik Sharma, Amit Nayak Evaluation Of Acute Oral Toxicity Of Nigella Sativa Linn Seed Methanolic Extract In Mice World Journal Of Pharmacy And Pharmaceutical Sciences Volume 3, Issue 4, 973-982. Research Article ISSN 2278 – 4357.

57. Deepak Prashar, Khokra SL, Rahul Purohit, Shalini Sharma Curcumin: A Potential Bioactive Agent Research Journal of Pharmaceutical, Biological and Chemical Sciences October – December 2011 RJPBCS Volume 2 Issue 4 Page No. 45.

58. Sikha A, Harini A, Hegde Prakash L Pharmacological activities of wild turmeric (Curcuma aromatica Salisb): a review Journal of Pharmacognosy and Phytochemistry 2015; 3(5): 01-04.

59. S.Revathi And N. S. Malathy Antibacterial Activity of Rhizome of Curcuma aromatica and Partial Purification of Active Compounds.

60. Ammayappan Rajam Srividya*, Palanisamy Dhanabal, Parthkumar Bavadia, Vaithiyalingam Jagannathan Vishnuvarthan, Muthureddy Natarajan Sathish Kumar Ammayappan Rajam Srividya et al / IJRAP 3(3), May – Jun 2012.

61. Hamid Nasri1, Najmeh Sahinfard, Mortaza Rafieian, Samira Rafieian, Maryam Shirzad5, Mahmoud Rafieian-kopaei Turmeric: A spice with multifunctional medicinal properties J HerbMed Pharmacol. 2014; 3(1): 5-8.

62. Pathartha guna vilakkam. Pg no:301

63. Hakkim P.M.Abdulla sayupu Anupoga vaithiya navaneetham, Thamarai Noolagam, Chennai. 2nd Edition. Part – 5. Pg no: 121, 54

64. Department of Human Oncology, School of Medicine and Public Health, University of Wisconsin, Madison, Wisconsin 53792, USA. Plumbagin, a medicinal plant-derived naphthoquinone, is a novel inhibitor of the growth and invasion of hormone-refractory prostate cancer. 2008 Nov 1;68(21):9024-32. doi: 10.1158/0008-5472.CAN-08-2494.

65. Tong-Peng Xu, Hua Shen, Ling-Xiang Liu, Yong-Qian Shu Plumbagin from Plumbago Zeylanica L Induces Apoptosis in Human Non-small Cell Lung Cancer Cell Lines through NF-kB Inactivation DOI:http://dx.doi.org/10.7314/APJCP.2013.14.4.2325.

66.Peking University People's Hospital, Institute of Hematology, Beijing, China. Plumbagin induces ROS-mediated apoptosis in human promyelocytic leukemia cells in vivo. 2010 May;34(5):658-65. doi: 10.1016/j.leukres.2009.08.017. Epub 2009 Sep 12.

67. Department of Radiation Oncology, Far Eastern Memorial Hospital, Graduate Institute of Traditional Chinese Medicine, Chang Gung University, Taoyuan, Taiwan. Plumbagin, isolated from Plumbago zeylanica, induces cell death through apoptosis in human pancreatic cancer cells. 2009;9(6):797-809. doi: 10.1159/000210028. Epub 2010 Jan 28.

68. Rohini Ahuja, Neeraj Agrawal, Alok Mukerjee Evaluation of anticancer potential of Terminalia chebula Fruits against Ehrlich Ascites Carcinoma induced cancer in mice. Journal of Scientific and Innovative Research 2013; 2 (3): 549-554

69. Naresh Kumar, Gangappa D, Geetika Gupta and Roy Karnati. Chebulagic acid from Terminalia chebula causes G1 arrest, inhibits NFκB and induces apoptosis in retinoblastoma cells

70. Meiling Wang2, Limin Yang1, Musi Ji3, Pengwei Zhao1, Peng Sun1, Ruixia Bai4, Yunpeng Tian1, Liping Su1 and Cunbao Li Aqueous Extract of *Terminalia chebula* Induces Apoptosis in Lung Cancer Cells Via a Mechanism Involving Mitochondria-mediated Pathways. Braz. Arch. Biol. Technol. v.58 n.2: pp. 208-215, Mar/Apr 2015.

71. Bupesh G1, Manikandan E, Thanigaiarul K, Magesh S, Senthilkumar V, Tamilarasan S, Pandian K, Gurib-Fakim A, and Maaza M Enhanced Antibacterial, Anticancer Activity from Terminalia chebula Medicinal Plant Rapid Extract by Phytosynthesis of Silver Nanoparticles Core-shell Structures. Bupesh et al., J Nanomed Nanotechnol 2016, 7:1

72. Deena Priscilla H.1 and Jasmine R. Evaluation of in vitro anticancer activity of Terminalia chebula and Identification of Phytocompounds by GC MS analysis. Journal of Chemical and Pharmaceutical Research, 2016, 8(7):683-688.

73. Gorkem Dulger, Basaran Dulger Antimicrobial activity of the seeds of Hyoscyamus niger L. (Henbane) on microorganisms isolated from urinary tract infections Journal of Medicinal Plants Studies 2015; 3(5): 92-95. Kumar et al. BMC Complementary and Alternative Medicine 2014, 14:319

74. Lignanamides and nonalkaloidal components of Hyoscyamus niger seeds.

75. Dharmendra Kumar Khatri , Archana Ramesh Juvekar Propensity of *Hyoscyamus niger* seeds methanolic extract to allay stereotaxically rotenone-induced Parkinson's disease symptoms in rats Oriental Pharmacy and Experimental Medicine December 2015, Volume 15, Issue 4, pp 327–339

76. Basaran Dulger, Beyza S. Goncu And Fahrettin Gucin Antibacterial Activity of the Seeds of Hyoscyamus niger L. (Henbane) Asian Journal of Chemistry. Vol. 22, No. 9 (2010), 6879-6883.

77. Ghorbanpour M (Ph.D.) , Ghafarzadegan R (M.Sc.)2 , Hatami M (Ph.D.) Seed Alkaloids Content and Antioxidant Enzymes Activity in Black Henbane as Influenced by Ammonium Nitrate Application and Water Deficit Stress. Journal of Medicinal Plants.

78. Anahita Alizadeh, Mohammad Moshiri, Javad Alizadeh, Mahdi Balali-Mood. Black henbane and its toxicity – a descriptive review. AJP, Vol. 4, No. 5, Sep-Oct 2014

79. Mohammad Hassan Ghosian1 , Mohammad Moradi 2* , Esmat Yaghout poor Assessment of Hyoscyamus niger seeds alcoholic extract effects on acute and chronic pain in male NMRI rats. Basic And Clinical Pathophysiology. Volume1, Number1, 2012.

80. Ram Garg , Rahul Kumar, Deepak Nathiya , Omprakash Goshain , Vinita Trivedi, Ashish Kumar Sharma,Krishna Murti Comparative Acute Toxicity Studies of Selected Indigenous Herbal Plants in Swiss Albino Mice. IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS) Volume 11, Issue 3 Ver. I (May.- Jun.2016), PP 20-27

81. Kyung-Mi Chang, Soo-Im Choi, and Gun-Hee Kim. Anti-oxidant Activity of Saussurea lappa C.B. Clarke Roots Vol 17, p 306～309 (2012)

82. Department of Pharmacology and Pathology, Ziauddin Medical University, Karachi, Pakistan. Antihepatotoxic activity of Saussurea lappa extract on D-galactosamine and lipopolysaccharide-induced hepatitis in mice.

83. Cancer Research Institute, Department of Tumor Biology, College of Medicine, Seoul National University, Seoul 110-799, South Korea. Saussurea lappa induces G2-growth arrest and apoptosis in AGS gastric cancer cells.

84. Moon SM[1], Yun SJ, Kook JK, Kim HJ, Choi MS, Park BR, Kim SG, Kim BO, Lee SY, Ahn H, Chun HS, Kim DK, Kim CS.Anticancer activity of Saussurea lappa extract by apoptotic pathway in KB human oral cancer cells.

85. Ravi Shankar Pandey. Saussurea lappa extract modulates cell mediated and humoral immune response in mice Scholars Research Library Der Pharmacia Lettre, 2012, 4 (6):1868-1873.

86**.** Ha-Rim Kim, Jeong-Mi Kim, Mi-Seong Kim, Jin-Ki Hwang1, Yeon-Ju Park1, Sei-Hoon Yang, Hye-Jung Kim,Do-Gon Ryu, Dong-Sung Lee, Hyuncheol Oh, Youn-Chul Kim, Yun-Jin Rhee, Byung-Soon Moon, Saussurea lappa extract suppresses TPA-induced cell invasion via inhibition of NF-κB-dependent MMP-9 expression in MCF-7 breast cancer cells. BMC Complementary and Alternative Medicine 2014, 14:170

87. Tzu-Chieh Hung,1 Wen-Yuan Lee,1,2,3 Kuen-Bao Chen,1,2,4 and Calvin Yu-Chian Chen1. Lead Screening for CXCR4 of the Human HIV Infection Receptor Inhibited by Traditional Chinese Medicine. Hindawi Publishing Corporation BioMed Research International.

88. PR Tirgar, KV Shah, VP Patel, TR Desai, RK Goyal Investigation into mechanism of action of anti-diabetic activity of Emblica officinalis on streptozotocin induced type I diabetic rat Research Journal of Pharmaceutical, Biological and Chemical Sciences. October – December 2010 RJPBCS 1(4) Pag

89. 1st S. Dasaroju 2nd K. Mohan Gottumukkala Current trends in the research of Emblica officinalis (Amla): A pharmacological perspective**.**

90. Ak Meena ,Arjun Singh, Mm Rao Evaluation Of Physicochemical And Preliminary Phytochemical Studies On The Fruit Of Emblica Officinalis Gaertn Asian Journal of Pharmaceutical and Clinical Research Vol. 3, Issue 3, 2010 .

91. M. Krishnaveni And S. Mirunalini Amla – The Role Of Ayurvedic Therapeutic Herb In Cancer. Asian Journal of Pharmaceutical and Clinical Research Vol. 4, Issue 3

92. 1st S.K. Verma 2nd A. Shaban 3rd R. Nautiyal Last M.L. Chimata In vitro cytotoxicity of Emblica officinalis against different human cancer cell lines**.**

93. R.C.Agrawal, Rajni Sharma and Maheshwari, S.k. Antimutagenic and wound healing activity of Emblica officinalis extract in Swiss Albino mice International Journal of Scientific & Engineering Research Volume 3, Issue 5, May-2012.

94. De A[1], De A, Papasian C, Hentges S, Banerjee S, Haque I, Banerjee SK. Emblica officinalis extract induces autophagy and inhibits human ovarian cancer cell proliferation, angiogenesis, growth of mouse xenograft tumors. Aug 15;8(8):e72748. doi: 10.1371/journal.pone.0072748. eCollection 2013.

95. Dong Wook Lim , Jae Goo Kim , and Yun Tai Kim Analgesic Effect of Indian Gooseberry (Emblica officinalis Fruit) Extracts on Postoperative and Neuropathic Pain in Rats. Received: 29 July 2016; Accepted: 18 November 2016; Published: 26 November 2016.

96. Noor Nazirahanie Abrahim1,2, M S Kanthimathi1,2 and Azlina Abdul-Aziz Piper betle shows antioxidant activities, inhibits MCF-7 cell proliferation and increases activities of catalase and superoxide dismutase Abrahim et al. BMC Complementary and Alternative Medicine 2012, 12:220.

97. Devjani Chakraborty*, Barkha Shah Antimicrobial, Antioxidative And Antihemolytic Activity Of Piper Betel Leaf Extracts. International Journal of Pharmacy and Pharmaceutical Sciences ISSN- 0975-1491 Vol 3, Suppl 3, 2011.

98. Rutugandha Paranjpe, Sushma R.Gundala,N.Lakshminarayana, Arpana Sagwal, Ghazia Asif, Anjali Pandey and Ritu Aneja *Piper betel* leaf extract: anticancer benefits and bio-guided fractionation to identify active principles for prostate cancer management.

99. Thomas M.Walter* H.Nalini Sofia Effects of Consumption of Thamboolam (Conventional Betel Chewing) in Traditional Siddha Medicine

100. Badrul Alam1,2, Rajib Majumder2, Shahina Akter2 And Sang-Han Lee. *Piper betle* extracts exhibit antitumor activity by augmenting antioxidant potential ONCOLOGY LETTERS 9: 863-868, 2015 Received March 6, 2014; Accepted September 26, 2014.

101. Biswajit Patra, Mihir Tanay Das and Surjendu Kumar Dey A review on Piper betle L. JMPS 2016; 4(6): 185-192© 2016 JMPSReceived: 25-09-2016 Accepted: 26-10-2016.

102. Sunil Kumar Shah, Gopal Garg, Deenanath Jhade, Narendra Patel Piper Betle: Phytochemical, Pharmacological and Nutritional Value in Health Management Int. J. Pharm. Sci. Rev. Res., 38(2), May – June 2016; Article No. 34, Pages: 181-189

103. Vengaiah PC1, Ravindrababu D2, Murthy GN3 & Prasad KR,Horticultural Research Station, Pandirimamidi-533288, Andhra Pradesh college of Agricultural Engineering, Bapatla-522101, Andhra Pradesh

104. Leela Chauhan1,2, Kumar Satya Prakash3, P.P. Srivastav1 And Khalid Bashir,Physicochemical And Thermal Properties Of Candy Crystals Prepared From Palmyra-Palm Jaggery Journal of Food Process Engineering ISSN 1745–45-30

CHAPTER 10

ANNEXURE

The following certificates are enclosed

1. Research Methodology and Biostatictics
2. Authentication Certificate for herbal Plants
3. Authentication Certificate for mineral drug
4. IAEC Certificate for Acute and Long term toxicity study

ANNEXURE

INGREDIENTS OF IDIVALLATHI MEZHUGU

Figure 1: Semicarpus Anacardium

Figure 2: Sesamum Indicum

Figure 3: Withania Somnifera

Figure 4: Smilax china

Figure 5: Celastrus paniculatus

Figure 6: Piper longum

Figure 7: Nigella Sativa

Figure 8: Curcuma aromatic

Figure 9: Plumbago indica

Figure 10: Terminalia chebula

Figure 11: Hyoscyamus niger

Figure 12: Saussurea lappa

Figure 13: Petiolate of piper betle

Figure 14: Kopparai Thengai

Figure 15:Palm Jaggery

Figure 16:Emblica officinalis

Figure 17: Rasakarppuram

PREPARATION OF IDIVALLATHI MEZHUGU

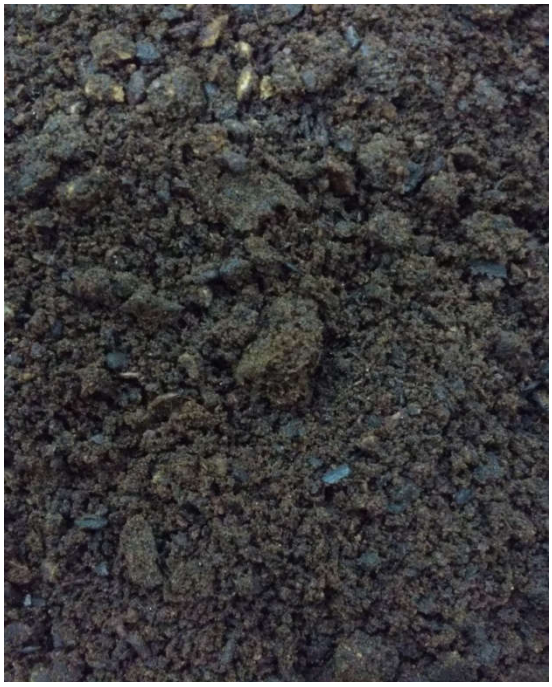


Figure 18

Figure 19

Figure 20

Figure 21

IDIVALLATHI MEZHUGU

KOPPARAI THENGAI

SMILAX CHINA

PIPER BETLE

EMBLICA OFFICINALIS

CELASTRUS PANICULATUS

CURCUMA AROMATICA

SEMICARPUS ANACARDIUM

RASAKARPOORAM

HYOSCYAMUS NIGER

PIPER LONGUM

PALM JAGGERY

PLUMBAGO INDICA

SESAMUM INDICUM

TERMINALIA CHEBULA

SAUSSUREA LAPPA

WITHANIA SOMNIFERA

NIGELLA SATIVA